

SHARP SERVICE MANUAL

SY911R23ATH/

COMMERCIAL MICROWAVE OVEN



R-23AT

MODELS **R-22AM**
R-23AM
R-23AT

In interests of user-safety the oven should be restored to its original condition and only parts identical to those specified should be used.

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SHARP CORPORATION

CAUTION

MICROWAVE RADIATION

Personnel should not be exposed to the microwave energy which may radiate from the magnetron or other microwave generating devices if it is improperly used or connected. All input and output microwave connections, waveguides, flanges and gaskets must be secured.

Never operate the device without a microwave energy absorbing load attached.

Never look into an open waveguide or antenna while the device is energized.

VARNING

MICKROVAGSSTRÅLING

Personal får inte utsättas för mikrovågsenergi som kan utstråla från magnetronen eller andre mikrovågssalstrande anordningar om dessa är felanslutna eller används på fel sätt. Alla in-och utgångsanslutningar för mikrovågor, vågledare, flänsar och packningar måste vara fast anslutna.

Mikrovågsgeneratoren får inte arbeta utan att absorberande belastning är ansluten. Titta aldrig in i en öppen vågledare eller antenn när mikrovågsgeneratoren är påkopplad eller laddad.

VAROITUS

MIKROAALTOSÄTELYÄ

Käyttäjä ei saa joutua alttiiksi mikroaaltoenergialle, jota voi säteillä magnetronista tai muusta mikroaaltoja kehittävästä laitteesta, jos sitä käytetään tai jos se kytketään väärin. Kaikkien mikroaaltoliitännöiden sekä syöttö-että ulostulopuolella, aaltoputkien laippojen ja tiivisteiden tulee olla varmistettuja.

Mikroaaltouunnia ei koskaan saa käyttää ilman kuormaa jossa mikroaaltoenergiaa kuluu. Avoimeen aaltoputkeen tai antenniin ei koskaan saa katsoa virran ollessa kytkettynä.

ADVARSEL

MIKROBØLGESTRÅLING

Personell må ikke utsettes for mikrobølge-energi som kan utståles fra magnetronen eller andre mikrobølge-generende deler dersom apparatet feilbetjenes eller blir feiltikoplet. Alle inn-og ut-tilkoplinger i forbindelse med mikrobølge-strålingen, bølgeledere, flenser og tetningsringer/pakninger må festes ordentlig.

Aldri bruk apparatet med mindre en mikrobølge-absorberende last er plassert i ovnsrommet.

Aldri se direkte inn i en åpen bølgeleder eller antenne imens apparatet er strømførende.

ADVARSEL

MIKROBØLGEBESTRÅLING

Man bør ikke udsætte sig for mikrobølgebestråling fra magnetronen eller andre mikrobølgefrembringende anordninger, hvilket kan ske hvis apparatet er forkert tilsluttet eller bruges forkert. Alle mikrobølgeindgange og-udgange, bølgeledere, flanger og tætningsstrimler må være forsvarligt udført.

Anvend aldrig ovnen uden en mikrobølgesabsorberende anordning. Se aldrig ind i en åben bølgeleder eller antenne, mens ovnen er i brug.

SERVICE MANUAL

SHARP

COMMERCIAL MICROWAVE OVEN

R-22AM/ R-23AM/ R-23AT

GENERAL IMPORTANT INFORMATION

This Manual has been prepared to provide Sharp Corp. Service engineers with Operation and Service Information.

It is recommended that service engineers carefully study the entire text of this manual, so they will be qualified to render satisfactory customer service.

CAUTION
MICROWAVE RADIATION
DO NOT BECOME EXPOSED TO RADIATION FROM THE
MICROWAVE GENERATOR OR OTHER PARTS THAT CON-
DUCT MICROWAVE ENERGY.

WARNING

Note: The parts marked "*" are used in voltage more than 250V. (Parts List)

Anm: Delar märket med "*" har en spänning överstigande 250V.

Huom: Huolto-ohjeeseen merkitty "tähdellä" osat joissa jännite on yli 250 V.

Bemerk: Deler som er merket "asterisk" er utsatt for spenninger over 250V til jord.

Bemærk: "Dele mærket med stjerne benyttes med højere spænding end 250 volt.

WARNING

Never operate the oven until the following points are ensured.

- (A) The door is tightly closed.
- (B) The door brackets and hinges are not defective.
- (C) The door packing is not damaged.
- (D) The door is not deformed or warped.
- (E) There is not any other visible damage with the oven.

Servicing and repair work must be carried out only by trained service engineers.

All the parts marked "*" on parts list are used at voltage more than 250V.

Removal of the outer wrap gives access to potential above 250V.

All the parts marked "Δ" on the parts list may cause undue microwave exposure, by themselves, or when they are damaged, loosened or removed.

SHARP CORPORATION

OSAKA, JAPAN

SERVICING

PRODUCT SPECIFICATIONS

GENERAL INFORMATION

APPEARANCE VIEW

OPERATING SEQUENCE

FUNCTION OF IMPORTANT COMPONENTS

TROUBLESHOOTING GUIDE AND TEST PROCEDURE

TOUCH CONTROL PANEL

COMPONENT REPLACEMENT AND ADJUSTMENT PROCEDURE

MICROWAVE MEASUREMENT

TEST DATA AT A GLANCE

WIRING DIAGRAM

PARTS LIST

SERVICING

WARNING TO SERVICE PERSONNEL

(GB) Microwave ovens contain circuitry capable of producing very high voltage and current, contact with following parts will result in electrocution. High voltage capacitor, High voltage transformer, Magnetron, High voltage rectifier assembly, High voltage fuses, High voltage harness.

REMEMBER TO CHECK 3D

- 1) Disconnect the supply.
- 2) Door opened, and wedged open.
- 3) Discharge two high voltage capacitors.

WARNING: AGAINST THE CHARGE OF THE TWO HIGH-VOLTAGE CAPACITORS

The two high-voltage capacitors remains charged about 60 seconds after the oven has been switched off. Wait for 60 seconds and then short-circuit the connection of the two high-voltage capacitors (that is, of the connecting lead of the high-voltage rectifier) against the chassis with the use of an insulated screwdriver.

Sharp recommend that wherever possible fault-finding is carried out with the supply disconnected. It may in, some cases, be necessary to connect the supply after the outer case has been removed, in this event carry out 3D checks and then disconnect the leads to the primary of the two High voltage transformers. Ensure that these leads remain isolated from other components and the oven chassis. (Use insulation tape if necessary.) When the testing is completed carry out 3D checks and reconnect the leads to the primary of the two High voltage transformers.

REMEMBER TO CHECK 4R

- 1) Reconnect all leads removed from components during testing.
- 2) Replace the outer case (cabinet).
- 3) Reconnect the supply.
- 4) Run the oven. Check all functions.

Microwave ovens should not be run empty. To test for the presence of microwave energy within a cavity, place a cup of cold water on the oven turntable, close the door and set the power to HIGH and set the microwave timer for one (1) minute. When the one minute has elapsed (timer at zero) carefully check that the water is now hot. If the water remains cold carry out 3D checks and re-examine the connections to the component being tested.

When all service work is completed, and the oven is fully assembled, the microwave power output should be checked and a microwave leakage test should be carried out.

(NL) Magnetronovens bevatten circuits die een zeer hoge spanning en stroom kunnen voortbrengen. Contact met de volgende onderdelen kan elektrocutie tot gevolg hebben.
Hoogspanningscondensator, hoogspanningstransformator, magnetron, hoogspanningsgelijkrichter, hoogspannings kabelboom.

VERGEET DE VOLGENDE 3 STAPPEN NIET

- 1) Haal de stekker uit het stopcontact.
- 2) Open de deur en zorg ervoor dat hij niet dicht kan vallen.
- 3) Ontlaad de hoogspanningscondensator.

PAS OP VOOR DE ELECTRISCHE LADING VAN DE HOOGSPANNINGSCONDENSATOR

De hoogspanningscondensator blijft nog ongeveer 60 seconden lang opgeladen, nadat de oven is uitgeschakeld. Wacht 60 seconden voordat u de verbinding van de hoogspannings-condensator (m.a.w. de verbindingsdraad van de hoogspanningsgelijkrichter) met een geïsoleerde schroevendraaier kortsluit tegen het chassis.

Sharp beveelt ten sterkste aan dat, voor zover mogelijk, defecten worden opgespoord wanneer de stekker uit het stopcontact is gehaald. Soms is het nodig om de stroomtoevoer weer tot stand te brengen nadat de buitenmantel verwijderd is. Herhaal dan de bovengenoemde 3 stappen en haal de elektrische draden uit de primaire zijde van de vermogenstransformator. Zorg ervoor dat deze draden geïsoleerd blijven van andere elementen en van het chassis van de oven. (Gebruik zo nodig isolatieband.) Wanneer de test is uitgevoerd, herhaalt u de bovenstaande 3 stappen en verbindt u de elektrische draden weer aan de primaire zijde van de vermogenstransformator.

VERGEET DE VOLGENDE 4 STAPPEN NIET

- 1) Sluit de draden weer aan die zijn losgehaald voor de test.
- 2) Plaats de buitenmantel weer om het toestel heen (kabinet).
- 3) Stop de stekker weer in het stopcontact.
- 4) Zet de oven aan. Controleer alle functies.

Magnetronovens mogen niet leeg aangezet worden. Om te controleren of er microgolf-energie binnen de oven wordt geproduceerd, plaatst u een mok met koud water op de draaitafel van de oven, sluit de deur, zet de oven op HIGH en stelt de klok van de magnetron in op twee (2) minuten. Wanneer de twee minuten voorbij zijn (klok staat op nul), controleert u voorzichtig of het water heet is. Indien het water nog steeds koud is, herhaalt u de allereerste drie stappen en controleer nogmaals de aansluitingen naar de geteste onderdelen.

Wanneer alle reparaties zijn uitgevoerd en de oven weer in elkaar is gezet, moet de het magnetronvermogen worden gecontroleerd en moet worden gecontroleerd of er geen microgolfflekage is.

- (E)** Los hornos de microondas contienen circuitos eléctricos capaces de producir voltajes de alta tensión y descargas eléctricas. Para evitar el riesgo de electrocución, absténgase de tocar los siguientes componentes: condensador de alta tensión, transformador de alta tensión, magnetrón, dispositivo del rectificador de alta tensión y arnés de alta tensión.

RECUERDE LA COMPROBACION 3D

- 1) Desconecte la alimentación.
- 2) Deje la puerta abierta y calzada.
- 3) Descargue el condensador de alto voltaje.

ADVERTENCIA SOBRE LA CARGA DEL CONDENSADOR DE ALTO VOLTAJE

El condensador de alto voltaje permanece cargado unos 60 segundos después de haber apagado el horno. Espere 60 segundos y luego ponga en cortocircuito la conexión del condensador de alto voltaje (esto es, del conductor de conexión del rectificador de alto voltaje) al chasis con un destornillador de mango aislado.

Se recomienda encarecidamente que siempre que sea posible la localización de fallos se realice con la alimentación desconectada. Puede ser que en algunos casos sea necesario conectar la alimentación después de haber retirado la carcasa exterior. En este caso, realice las comprobaciones 3D y luego desconecte los conductores del primario del transformador de alimentación. Asegúrese de que estos conductores permanezcan aislados de otros componentes y del chasis del horno. (Use cinta aislante si es necesario). Cuando termine la prueba efectúe las comprobaciones 3D y reconecte los conductores al primario del transformador de alimentación.

RECUERDE LA COMPROBACION 4C

- 1) Conecte todos los componentes desconectados de los componentes durante la prueba.
- 2) Coloque la carcasa exterior (cabinas).
- 3) Conecte la alimentación.
- 4) Compruebe todas sus funciones después de poner en marcha el horno.

Los hornos de microondas no deben funcionar vacíos. Para comprobar la presencia de energía de microondas dentro de una cavidad, coloque una taza de agua fría en el plato giratorio del horno, cierre la puerta y ponga la potencia en HIGH (alta) y coloque el temporizador en dos (2) minutos. Cuando transcurran los dos minutos (temporizador a cero) compruebe cuidadosamente que el agua se ha calentado. Si el agua permaneciese fría, efectúe las comprobaciones 3D y vuelva a examinar las conexiones de los componentes que han sido probados.

Cuando haya terminado la intervención en el equipo y el horno haya sido ensamblado de nuevo completamente, deberá comprobar la potencia de salida de microondas y realizar una prueba de fugas de microondas.

- (SV)** Mikrovågsugnar innehåller kretsar som producerar mycket höga spänningar och strömmar. Kontakt med följande komponenter kan leda till dödsfall: Högspänningskondensator, transformator, magnetron, högspännings likriktare, högspännings kablage.

KOM IHÅG ATT KONTROLLERA 3 STEG

- 1) Koppla från strömkällan.
- 2) Öppna dörren på glänt.
- 3) Ladda ur högspänningskondensatorn.

VARNING FÖR LADDNINGEN I HÖGSPÄNNINGSKONDENSATORN

Högspänningskondensatorn är laddad i 60 sekunder efter det att ugnen stängts av. Vänta 60 sekunder och korrslut sedan kondensators anslutning (dvs anslutningen till högspänningslikriktaren) till chassiet med hjälp av en isolerad skruvmejsel.

Sharp rekommenderar att felsökning sker med strömmen fränkopplad. Ibland kan det vara nödvändigt att koppla på strömmen efter det att höljet avlägsnats, utför då 3 Steg kontrollen och koppla sedan från ledarna till transformatorns primärsida. Se till att ledarna är isolerade från andra komponenter och chassiet. (Använd isoleringsband om det behövs). När Du testat färdigt utför Du 3 Steg kontrollen och ansluter ledningarna till transformatorns primärsida igen.

KOM IHÅG ATT KONTROLLERA 4 STEG

- 1) Anslut alla ledningar som använts vid testning
- 2) Sätt tillbaka ytterhöljet.
- 3) Anslut strömkällan på nytt.
- 4) Sätt på ugnen. Kontrollera alla funktioner.

Mikrovågsugnar får inte användas tomma. Kontrollera mikrovågsstrålningen i olika delar av ugnen genom att placera en kopp med kallt vatten på ugnens tallrik, stäng dörren, ställ in HIGH och ställ in 2 minuter på timern. När två minuter har gått (timern visar 0) kontrollerar du om vattnet är varmt. Om vattnet fortfarande är kallt utför Du 3 steg kontroller och kontrollerar anslutningarna till varje enskild komponent på nytt.

När all service är klar och ugnen ihopskruvad skall ugnens uteffekt och eventuellt mikrovågsläckage kontrolleras.

- I** I forni a microonde contengono un circuito elettrico in grado di generare tensioni e correnti estremamente elevate. L'eventuale contatto con i seguenti componenti può causare la folgorazione: condensatore ad alta tensione; trasformatore ad alta tensione; magnetron; rettificatore alta tensione; cablaggio ad alta tensione.

TRE OPERAZIONI IMPORTANTI PER INCOMINCIARE

- 1) Scollegare l'alimentazione elettrica.
- 2) Verificare che la porta sia bloccata in posizione aperta.
- 3) Scaricare il condensatore ad alta tensione.

ATTENZIONE AL CONDENSATORE AD ALTA TENSIONE: PUO ESSERE CARICO

Il condensatore ad alta tensione rimane carico per circa 60 secondi dopo lo spegnimento del forno. Occorre quindi aspettare 60 secondi prima di cortocircuitare, utilizzando un cacciavite con impugnatura isolata, il collegamento del condensatore ad alta tensione (cioè del conduttore di collegamento del raddrizzatore ad alta tensione) sul telaio del forno.

Sharp raccomanda, nei limiti del possibile, che la ricerca dei guasti avvenga in assenza di alimentazione elettrica. In alcuni casi tuttavia, può essere necessario alimentare l'apparecchio dopo aver rimosso la scatola esterna. In questo caso eseguire i tre controlli sopra citati e quindi scollegare i connettori dal primario del trasformatore. Assicurarsi che tali connettori non vengano a contatto con altri componenti, né con il telaio del forno (fare uso, se necessario, di nastro isolante). Al termine dell'intervento, eseguire nuovamente i tre controlli e ricollegare i conduttori al primario del trasformatore.

QUATTRO VERIFICHE IMPORTANTI DA NON DIMENTICARE

- 1) Ricollegare tutti i conduttori staccati dai vari componenti durante l'intervento.
- 2) Rimontare la scatola esterna.
- 3) Ripristinare l'alimentazione elettrica.
- 4) Rimettere in funzione il forno. Controllare tutte le funzioni.

I forni a microonde non devono mai funzionare a vuoto. Per verificare la presenza di energia da microonde all'interno di una cavità, mettere una tazza di acqua fredda sul piatto rotante del forno, chiudere la porta, regolare la potenza su HIGH ed impostare il temporizzatore su due (2) minuti. Trascorsi i due minuti (temporizzatore a zero), controllare accuratamente che ora l'acqua sia calda. Se l'acqua è rimasta fredda, eseguire i tre controlli iniziali e verificare nuovamente i collegamenti del componente in questione.

Dopo aver portato a termine le operazioni di manutenzione e rimontato il forno, è necessario controllare la potenza delle microonde emesse ed eseguire un test per verificare che non vi sia alcuna dispersione.



R-23AM

PRODUCT DESCRIPTION

SPECIFICATION

ITEM	DESCRIPTION		
Power Requirements	230 Volts 50 Hertz Single phase, 3 wire earthed		
Power Comsumption	2.4 kW Approx. 11 A [R-22AM] / 2.9 kW Approx. 13 A [R-23AM, R-23AT]		
Power Output	1500 W [R-22AM]/ 1800 W [R-23AM/23AT] nominal of RF microwave energy (measured by method of IEC 60705) Operating frequency 2450 MHz		
Case Dimensions	Width 510mm	Height 335 mm	Depth 470mm
Cooking Cavity Dimensions	Width 330 mm	Height 180 mm	Depth 330mm
Control Complement for R-23AT	Touch Control System		
	The combination of cooking time and microwave power		
	The oven can be programmed a series of up to 3 cooking stages.		
	The combination of microwave power and cooking time that can be input as folllows.		
	Cooking Sequence	Microwave power levelthat can be iused.	Cooking time that can be iused.
	1 Stage only	0-100%	Max. 30 minutes
	2 or 3 Stage	0-40% all stages	Max. 30 minutes any stages
			Max. 60 minutes for 2 stages
			Max. 90 minutes for 3 stages
		50-100%	Max. 30 minutes for 3 stages
NOTE: If the oven used with the power level above 40% on any stage, the maximum cooking time is 30 minutes in total.			
Microwave Power level 100% 90% 80% 70% 60% 50% 40% 30% 20% 10% 0%			
MANUAL / REPEAT key, NUMBER keys POWER LEVEL key, STOP / CLEAR key START Key, DOUBLE QUANTITY key DEFROST key, SET key CHECK key, VOLUME key			
Control Complement for R-22AM/23AM	Electronic Timer (0 - 30 minutes) Microwave Power level 100% 50% 20% 10% MICROWAVE POWER SETTING buttons START button		
Set Weight	Approx. 33 kg		

GENERAL INFORMATION

WARNING

THIS APPLIANCE MUST BE EARTHED

IMPORTANT

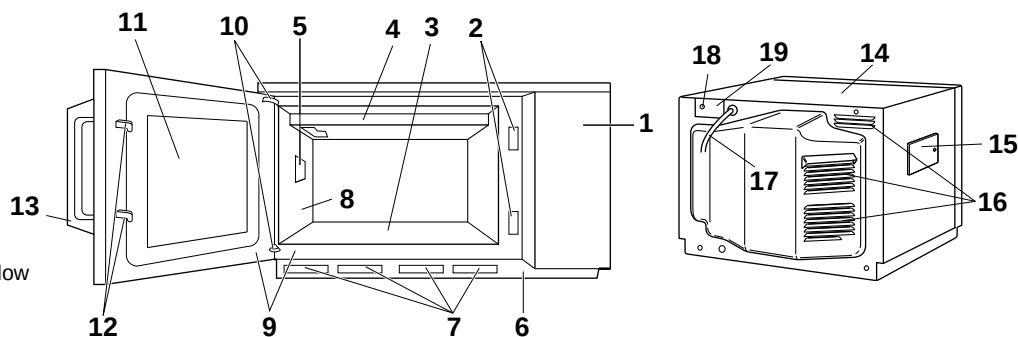
THE WIRES IN THIS MAINS LEAD ARE COLOURED IN ACCORDANCE WITH THE FOLLOWING CODE:

GREEN-AND-YELLOW	: EARTH
BLUE	: NEUTRAL
BROWN	: LIVE

OVEN

APPEARANCE VIEW

1. Control panel
2. Hole for safety door latches
3. Ceramic floor
4. Splash cover
5. Oven light
6. Air intake filter
7. Air intake openings
8. Oven cavity
9. Door seals and sealing surfaces
10. Door hinges
11. Oven door with see-through window
12. Door safety latches
13. Door handle.
14. Outer cabinet
15. Removable cover over oven light bulb
16. Air vent openings
17. Power supply cord
18. Mounting plate
19. Screw for mounting plate



AUTO TOUCH CONTROL PANEL

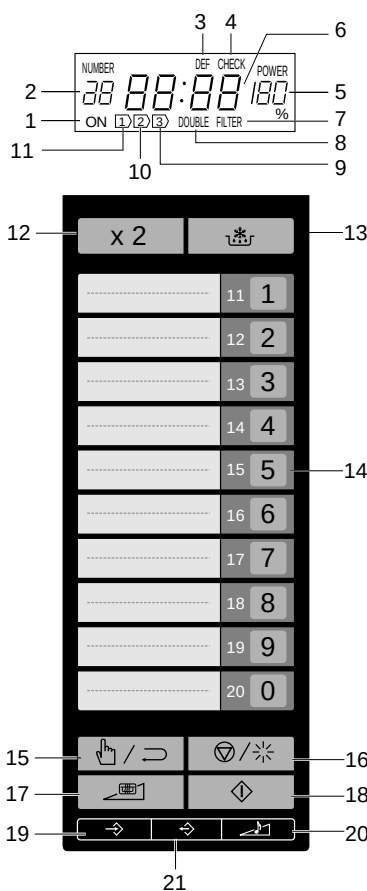
DISPLAY AND INDICATORS for R-23AT

Check indicators after the oven starts to confirm the oven is operating as desired.

1. Cook indicator
This indicator shows cooking in progress.
2. Memory number indicator
3. Defrost indicator
4. Check mode indicator
5. Power level display
6. Digital display
7. Filter indicator
8. Double quantity mode indicator
9. 3rd. stage indicator
10. 2nd. stage indicator
11. 1st. stage indicator

OPERATING KEYS

12. DOUBLE QUANTITY key
13. DEFROST key
14. NUMBER keys
15. MANUAL/ REPEAT key
16. STOP/CLEAR key
17. POWER SLEVEL key
18. START key
19. SET key
20. VOLUME key
21. CHECK key



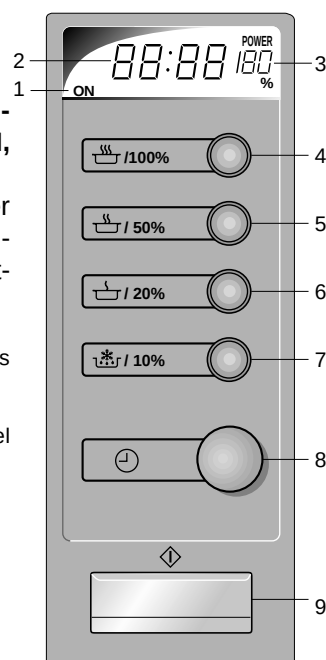
DISPLAY AND INDICATORS for R-22AM, R-23AM

Check indicators after the oven starts to confirm the oven is operating as desired.

1. Cook indicator
This indicator shows cooking in progress.
2. Digital display
3. Microwave power level display

OPERATING KEYS

4. HIGH 100%
5. MEDIUM 50%
6. MED LOW 20%
7. DEFROST 10%
8. ELECTRONIC TIMER
Rotate the control to enter cooking time.
9. START button



INSTALLATION INFORMATION

When this commercial microwave oven is installed near other commercial electrical appliances, connect a lead wire to each equivalent potential terminal with equipotential marking between them (insert a lead wire between a washer and an earth angle, and screw them), as shown in Fig. A-1, to make sure that they are at equivalent potential. If any lead wire is not connected between them, when person touch them he/she will get a electric shock.

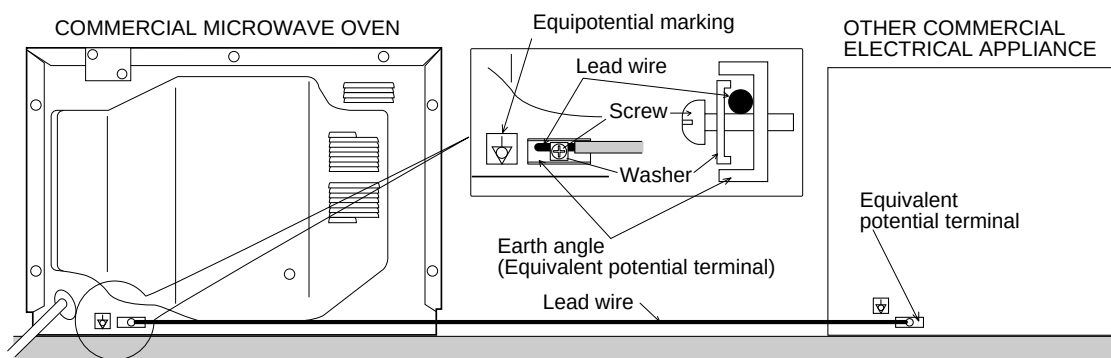


Figure A-1

OPERATION SEQUENCE

Closing the door activates all door interlock switches (1st latch switch, 2nd latch switch, 3rd latch switch and stop switch).

IMPORTANT

When the oven door is closed, the monitor switch contacts COM-NC must be open. When the microwave oven is plugged in a wall outlet (230 volts, 50Hz), the line voltage is supplied to the point A5+A7 in the control panel through the noise filter.

Figure O-1 on page 39

1. The digital display shows .

IDLE CONDITION

When the door is opened, the contacts of the 1st. latch switch SW1, 2nd. latch switch SW2, 3rd. latch switch SW3 and stop switch SW5 open, initiating the following:

Figure O-2 on page 40

1. A signal is input to the control unit energizing the coil of shut-off relay RY-1.
2. The shut-off relay RY-1 contacts close completing circuits to turn on the oven lamp, blower motor and stirrer motors.
3. If the door remains open, 60 seconds later the control unit de-energizes shut-off relay RY-1 turning off the oven lamp, blower motor and stirrer motors.

When the door is closed, the contacts of the 1st. latch switch SW1, 2nd. latch switch SW2, 3rd. latch switch SW3 and stop switch SW5 close. With the closing of the stop switch SW5 contacts, an additional circuit is provided which will permit the operation of the oven when one of the touch pads is depressed. Since the control is enabled through the stop switch SW5, the door must be closed before the touch pads will be effective. When the door is closed, a full 60 second IDLE condition is always provided for selecting and pressing the desired touch pads. A 60 second IDLE condition will also follow the end of each cook cycle.

MICROWAVE COOKING CONDITION

for R-23AT

Touch MANUAL/ REPEAT key and enter a desired cooking time with the touching NUMBER key. And then touch START key.

Function sequence Figure O-3 on page 40

CONNECTED COMPONENTS	RELAY
Oven lamp/ Blower motor/ Stirrer motors	RY1
High voltage transformer T1	RY3
High voltage transformer T2	RY4

for R-22AM/23AM

Enter a desired cooking time with the turning ELEC-TRONIC TIMER knob. And then push START button.

Function sequence Figure O-3 on page 40

CONNECTED COMPONENTS	RELAY
Oven lamp/ Blower motor/ Stirrer motors	RY1
High voltage transformer T1	RY2
High voltage transformer T2	RY3

1. The line voltage is supplied to the primary winding of

the two high voltage transformers. The voltage is converted to about 3.3 volts A.C. output on the filament winding and high voltage of approximately 2000 volts A.C. on the secondary winding.

2. The filament winding voltage (3.3 volts) heats the magnetron filament and the high voltage (2000 volts) is sent to the voltage doubling circuit, where it is doubled to negative voltage of approximately 4000 volts D.C..
3. The 2450 MHz microwave energy produced in the magnetron generates a wave length of 12.24 cm. This energy is channelled through the waveguide (transport channel) into the oven cavity, where the food is placed to be cooked.
4. When the cooking time is up, a signal tone is heard and the relays RY3+RY4 (for R-23AT)/ RY2+RY3 (for R-22AM/23AM) go back to their home position. The circuits to the high voltage transformers T1+T2. The relay RY1 remains and oven lamp, blower motor and stirrer motors work for 1 minute.
5. When the door is opened during a cook cycle, the switches come to the following condition.

SWITCH	CONTACT	CONDITION	
		DURING COOKING	DOOR OPEN (NO COOKING)
1st latch switch	COM-NO	Closed	Open
Monitor switch	COM-NC	Open	Closed
2nd latch switch	COM-NO	Closed	Open
Stop switch	COM-NO	Closed	Open
3rd latch switch	COM-NO	Closed	Open

The circuits to the high voltage transformers T1+T2 are cut off when the 1st latch, 2nd latch, 3rd latch and stop switches SW1+SW2+SW3+SW5 are made open. The blower motor BM, stirrer motors and oven lamp remains on even if the oven door is opened after the cooking cycle has been interrupted, because the relay RY1 stays closed. Shown in the display is the remaining time, but the program is cancelled if the oven is not started within 3 minutes.

6. MONITOR SWITCH CIRCUIT

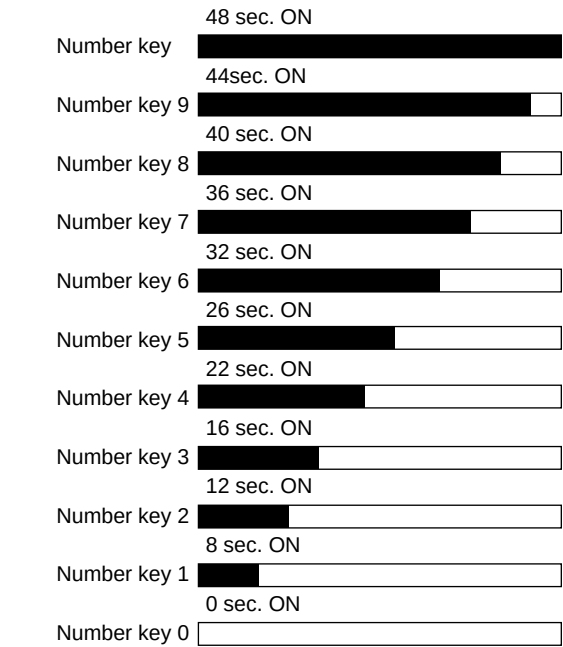
The monitor switch SW4 is mechanically controlled by oven door, and monitors the operation of the 1st latch switch SW1.

- 6-1. When the oven door is opened during or after the cycle of a cooking program, the 1st, 2nd, 3rd latch and stop switches SW1+SW2+SW3+SW5 must open their contacts first. After that the contacts (COM-NC) of the monitor switch SW4 can be closed.
- 6-2. When the oven door is closed, the contacts (COM-NC) of the monitor switch SW4 must be opened first. After that the contacts (COM-NO) of the 1st, 2nd, 3rd latch and stop switches SW1+SW2+SW3+SW5 must be closed.
- 6-3. When the oven door is opened and the contacts of the 1st latch switch SW1 remain closed, remains closed, the fuse F2 F6.3A will blow, because the monitor switch is closed and a short circuit is caused.

MICROWAVE VARIABLE COOKING (for R-23AT)

When the microwave oven is preset for variable cooking power, the line voltage is supplied to the high voltage

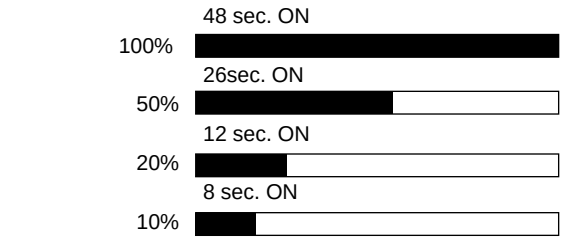
transformers T1+T2 intermittently within a 48 second time base through the contacts of the relays RY3+RY4. The following levels of microwaves power are given.



NOTE: The ON/OFF time ratio does not exactly correspond to the percentage of microwave power, because approx. 3 seconds are needed for heating up the magnetron filament.

MICROWAVE VARIABLE COOKING (for R-22AM and R-23AM)

When the microwave oven is preset for variable cooking power, the line voltage is supplied to the high voltage transformers intermittently within a 48 second time base through the contacts of the relays RY2+RY3. The following levels of microwaves power are given.



NOTE: The ON/OFF time ratio does not exactly correspond to the percentage of microwave power, because approx. 3 seconds are needed for heating up the magnetron filament.

TWO MAGNETRON OPERATION SYSTEM

Two magnetrons MG1+MG2 are equipped in order to get higher microwave power output. The primary windings of the high voltage transformers T1+T2 are connected so that each magnetron can be oscillated alternatively according to the frequency of the power supply. Refer to the Figure B-1 and B-2.

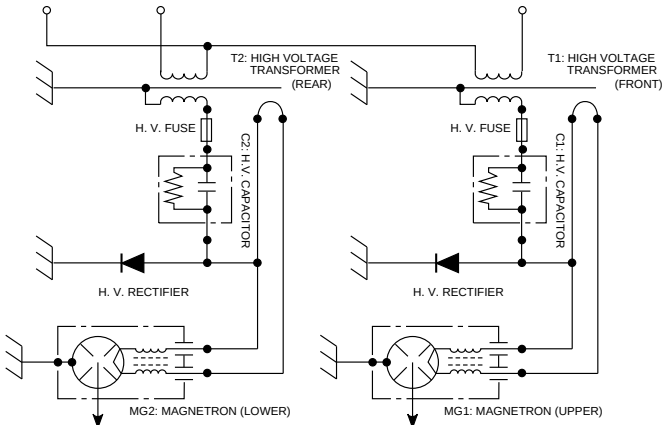


Figure B-1. High Voltage Circuit

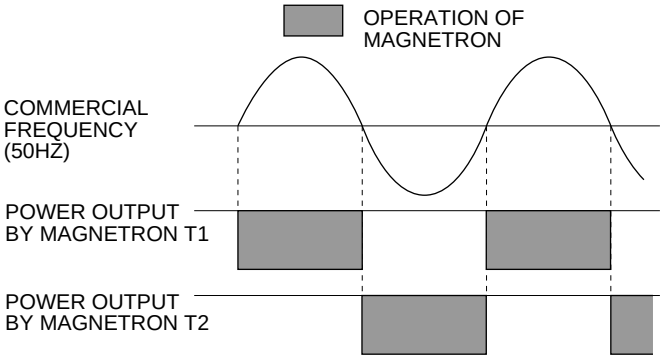


Figure B-2. Operation of Magnetron

FUNCTION OF IMPORTANT COMPONENTS

DOOR OPEN MECHANISM

1. The door release lever is pulled.
2. The upper latch head is lifted up by the linked door release lever.
3. The head lever is lifted up by the door release lever.
4. The joint lever is lifted up by the head lever.
5. The lower latch head is lifted up by the joint lever.
6. Now both latch heads are lifted up, so they can be released from the latch hook.
7. Now the door can be opened.

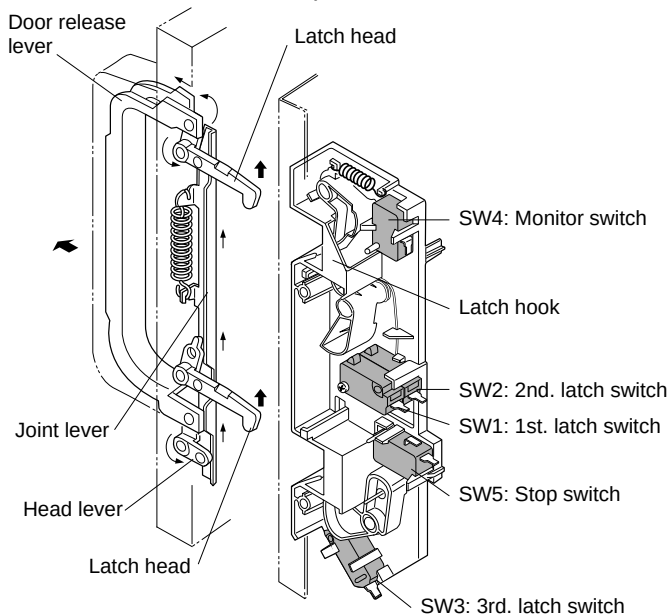


Figure D-1. Door Open Mechanism

1ST LATCH SWITCH SW1, 2ND LATCH SWITCH SW2, 3RD LATCH SWITCH SW3 AND STOP SWITCH SW5

1. When the oven door is closed, the contacts COM-NO must be closed.
2. When the oven door is opened, the contacts COM-NO must be opened.

MONITOR SWITCH SW4

The monitor switch SW4 is activated (the contacts opened) the upper latch head and switch lever A while the door is closed. The switch is intended to render the oven inoperative by means of blowing the fuse F2 F6.3A when the contacts of the 1st latch switch SW1 fail to open when the door is opened.

Function

1. When the door is opened, the monitor switch SW4 contacts close (to the ON condition) due to their being normally closed. At this time the 1st latch switch SW1 is in the OFF condition (contacts open) due to their being normally open contact switches.
2. As the door goes to a closed position, the monitor switch SW4 contacts are opened and 1st latch switch SW1 contacts are closed (On opening the door, each of these switches operate inversely.)
3. If the door is opened and the 1st latch switch SW1 contacts fail to open, the fuse F2 F6.3A blows simultaneously with closing of the monitor switch SW4 contacts.

CAUTION: BEFORE REPLACING A BLOWN FUSE F2 F6.3A TEST THE 1ST LATCH SWITCH SW1, MONITOR SWITCH SW4 AND MONITOR RESISTOR R1 FOR PROPER OPERATION. (REFER TO CHAPTER "TEST PROCEDURE").

MONITOR RESISTOR R1

The monitor resistor R1 prevents the fuse F2 F6.3A 250V bursting when the fuse F2 F6.3A 250V blows due to the operation of the monitor switch SW4.

NOISE FILTER

The noise filter assembly prevents radio frequency interference that might flow back in the power circuit.

WEAK POINT F1

If the wire harness or electrical components make a short-circuit, this weak point F1 blows to prevent an electric shock or fire hazard.

FUSE F2 F6.3A 250V

1. If the wire harness or electrical components are short-circuited, this fuse blows to prevent an electric shock or fire hazard.
2. The fuse F2 also blows when 1st latch switch SW1 remains closed with the oven door open and when the monitor switch closes.

FUSE(S) F3, F4 M8A

If the wire harness or the high voltage transformers T1, T2 are short-circuited, these fuses F3 and /or F4 blow to prevent an electric shock or fire hazard.

HIGH VOLTAGE FUSE(S) F5, F6

The high voltage fuse blows when the high voltage rectifier or the magnetron is shorted.

MAGNETRON TEMPERATURE FUSES TF1, TF2

The temperature fuses TF1, TF2 located on the top of the upper and lower waveguide, are designed to prevent damage to the magnetrons MG1, MG2. If an over heated condition develops in the tube due to blower motor failure, obstructed air ducts, dirty or blocked air intake, etc., the circuit to the magnetrons are interrupted. Under normal operation, the temperature fuses remains closed. However, when abnormally high temperatures are generated within the magnetrons, the temperature fuses will open at 150°C causing the microwave energy to stop. The defective temperature fuses must be replaced with new rated ones.

OVEN TEMPERATURE FUSE TF4

The temperature fuse TF4, located on the side of the exhaust duct assembly, is designed to prevent damage to the oven by fire. If the food load is overcooked, by either error in cook time or defect in the control unit, the temperature fuse will open. Under normal operation, the oven temperature fuse remains closed. However, when abnormally high temperatures are generated within the oven

cavity, the oven temperature fuse will open at 120°C, causing the oven to shut down. The defective temperature fuse must be replaced with new rated one.

BLOWER MOTOR TEMPERATURE FUSE TF3

This temperature fuse TF3 protects the blower motor against overheating. If its temperature goes above 120°C because the blower motor is stalled or the ventilation openings are blocked, the contacts of the temperature fuse will open. The line voltage to the control unit will be cut off and the operation of the oven will be stopped. The defective temperature fuse must be replaced with a new one.

OVEN THERMISTOR (1)

The thermistor is a negative temperature coefficient type. The temperature in the exhaust duct is detected through the resistance of the thermistor.

If the temperature is high, the control panel will display "EE7" and the oven will stop to avoid overheating and catching fire.

If the thermistor is open, the control panel will display "EE6" and the oven will stop.

OVEN THERMISTOR (2)

This thermistor detects temperature of the oven cavity bottom plate. The thermistor is a negative temperature coefficient type. The temperature is detected through the resistance of the thermistor.

If the temperature is high, the control will display "EE17" and the oven will stop.

MAGNETRON THERMISTOR

The thermistor is a negative temperature coefficient type. The air temperature around the upper magnetron is detected through the resistance of the thermistor.

If the temperature is high, the control panel will display "EE17" and the oven will stop to protect the lower magnetron against overheat.

If the oven thermistor (2) and the magnetron thermistor are open at the same time, the control panel will display "EE16" and the oven will stop.

BLOWER MOTOR BM

The blower motor BM drives a blade which draws external cool air into the oven. This cool air is directed through the air vanes surrounding the magnetrons and cools the magnetrons. This air is channelled through the oven cavity to remove steam and vapours given off from the heating foods. It is then exhausted through the exhausting air vents at the oven cavity.

STIRRER MOTORS SM

The upper and lower stirrer motors SM drive stirrer antennas to stir the microwave radiation from the upper and lower waveguides.

OVEN LAMP OL

The oven cavity light illuminates the interior of the oven so that food being cooked can be examined visually through the door window without having to open the door. The oven lamp is on during the cooking cycle and idle condition.

TROUBLESHOOTING GUIDE

When troubleshooting the microwave oven, it is helpful to follow the Sequence of Operation in performing the checks. Many of the possible causes of trouble will require that a specific test be performed. These tests are given a procedure letter which will be found in the "Test Procedure" section.

IMPORTANT: If the oven becomes inoperative because of a blown fuse F2 F6.3A in the 1st latch switch SW1 - monitor switch SW4 - monitor resistor R1 circuit, check the 1st latch switch SW1, monitor switch SW4 and monitor resistor R1 before replacing the fuse F2 F6.3A

TESTPROCEDURE		A	B	C	D	E	F	G	H	I	I	I	J	K	K	L	L	M																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																			
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TEST PROCEDURES

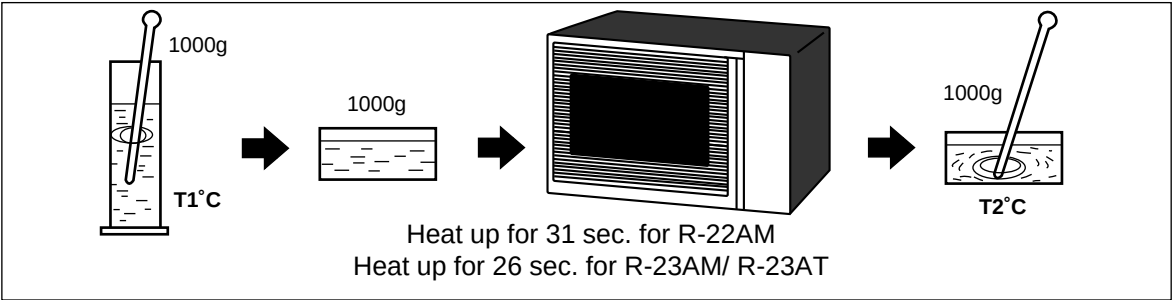
PROCEDURE LETTER	COMPONENT TEST								
A	MAGNETRON TEST NEVER TOUCH ANY PART IN THE CIRCUIT WITH YOUR HAND OR AN INSULATED TOOL WHILE THE OVEN IS IN OPERATION. CARRY OUT <u>3D</u> CHECKS. Isolate the magnetron from high voltage circuit by removing all leads connected to filament terminal. To test for an open circuit filament use an ohmmeter to make a continuity test between the magnetron filament terminals, the meter should show a reading of less than 1 ohm. To test for short circuit filament to anode condition, connect ohmmeter between one of the filament terminals and the case of the magnetron (ground). This test should be indicated an infinite resistance. If a low or zero resistance reading is obtained then the magnetron should be replaced. MICROWAVE OUTPUT POWER (1 litre water load) The following test procedure should be carried out with the microwave oven in a fully assembled condition (outer case fitted). Microwave output power from the magnetron can be measured by way of IEC 60705, i.e. it is measured by how much power the water load can absorb. To measure the microwave output power in the microwave oven, the relation of calorie and watt is used. When P(W) heating works for t(second), approximately $P \times t / 4.187$ calorie is generated. On the other hand, if the temperature of the water with V(ml) rises ΔT (°C) during this microwave heating period, the calorie of the water is $V \times \Delta T$. The formula is as follows; $P \times t / 4.187 = V \times \Delta T + 0.55 \times mc (T_2 - T_0) \quad P (W) = 4.187 \times V \times \Delta T / t + 0.55 \times mc (T_2 - T_0) / t$ Our condition for water load is as follows: <table style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 50%;">Room temperature (T₀) around 20°C</td> <td style="width: 50%;">Power supply Voltage Rated voltage</td> </tr> <tr> <td>Water load 1000 g</td> <td>Initial temperature (T₁) 10±1°C</td> </tr> <tr> <td>Heating time 28 sec. [R-22AM] / 23sec. [R-23AM/23AT]</td> <td>Mass of container (mc) 330 g</td> </tr> <tr> <td>T₂ Final temperature</td> <td>$P = 150 \times \Delta T$ [R-22AM] / $P = 180 \times \Delta T$ [R-23AM, R-23AT]</td> </tr> </table> Measuring condition: - Container The water container must be a cylindrical borosilicate glass vessel having a maximum material thickness of 3 mm and an outside diameter of approximately 190 mm. - Temperature of the oven and vessel The oven and the empty vessel are at ambient temperature prior to the start the test. - Temperature of the water The initial temperature of the water is (10±1)°C. - Select the initial and final water temperature so that the maximum difference between the final water temperature and the ambient temperature is 5°C. - Select stirring devices and measuring instruments in order to minimize addition or removal of heat. - The graduation of the thermometer must be scaled by 0.1°C at minimum and be an accurate thermometer. - The water load must be (1000±5) g. “t” is measured while the microwave generator is operating at full power. Magnetron filament heat-up time is not included. NOTE: The operation time of the microwave oven is “t + 3” sec. (3 sec. is magnetron filament heat-up time.) Measuring method: - Measure the initial temperature of the water before the water is added to the vessel. (Example: The initial temperature T₁ = 11°C) - Add the 1 litre water to the vessel. - Place the load on the centre of the shelf. - Operate the microwave oven at HIGH until the temperature of the water rises by a value ΔT of (10 ± 2) K. - Stir the water to equalize temperature throughout the vessel. - Measure the final water temperature. (Example: The final temperature T₂ = 21°C) - Calculate the microwave power output <u>P</u> in watts from above formula.	Room temperature (T ₀) around 20°C	Power supply Voltage Rated voltage	Water load 1000 g	Initial temperature (T ₁) 10±1°C	Heating time 28 sec. [R-22AM] / 23sec. [R-23AM/23AT]	Mass of container (mc) 330 g	T ₂ Final temperature	$P = 150 \times \Delta T$ [R-22AM] / $P = 180 \times \Delta T$ [R-23AM, R-23AT]
Room temperature (T ₀) around 20°C	Power supply Voltage Rated voltage								
Water load 1000 g	Initial temperature (T ₁) 10±1°C								
Heating time 28 sec. [R-22AM] / 23sec. [R-23AM/23AT]	Mass of container (mc) 330 g								
T ₂ Final temperature	$P = 150 \times \Delta T$ [R-22AM] / $P = 180 \times \Delta T$ [R-23AM, R-23AT]								

TEST PROCEDURES

PROCEDURE LETTER	COMPONENT TEST
	Room temperature $T_0 = 21^{\circ}\text{C}$ Initial temperature $T_1 = 11^{\circ}\text{C}$ Temperature after $(28 + 3) = 31$ sec [for R-22AM] $T_2 = 21^{\circ}\text{C}$ Temperature after $(23 + 3) = 26$ sec [for R-23AM/23AT] $T_2 = 21^{\circ}\text{C}$ Temperature difference Cold-Warm $\Delta T_1 = 10^{\circ}\text{C}$ Measured output power The equation is " $P = 150 \times \Delta T$ " [for R-22AM] $P = 150 \times 10^{\circ}\text{C} = 1500$ Watts The equation is " $P = 180 \times \Delta T$ " [for R-23AM/23AT] $P = 180 \times 10^{\circ}\text{C} = 1800$ Watts

JUDGMENT: The measured output power should be within the range of $\pm 15\%$ of the rated output power.

CAUTION: 1°C CORRESPONDS TO 150 WATTS [R-22AM]/ 180 WATTS [R-23AM, R-23AT]. REPEAT MEASUREMENT IF THE POWER IS INSUFFICIENT.



B HIGH VOLTAGE TRANSFORMER TEST

WARNING: High voltage and large currents are present at the secondary winding and filament winding of the high voltage transformer. It is very dangerous to work near this part when the oven is on. NEVER make any voltage measurements of the high-voltage circuits, including the magnetron filament.

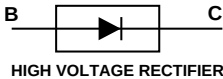
CARRY OUT 3D CHECKS.
Disconnect the leads to the primary winding of the high voltage transformer. Disconnect the filament and secondary winding connections from the rest of the HV circuitry. Using an ohmmeter, set on a low range, it is possible to check the continuity of all three windings. The following readings should be obtained:-

	R-22AM	R-23AM, R-23AT
a. Primary winding	approximately $1.8\ \Omega$	approximately $1.2\ \Omega$
b. Secondary winding	approximately $75\ \Omega$	approximately $75\ \Omega$
c. Filament winding	less than $1\ \Omega$	

If the readings obtained are not stated as above, then the high voltage transformer is probably faulty and should be replaced.
CARRY OUT 4R CHECKS.

C HIGH VOLTAGE RECTIFIER ASSEMBLY TEST

CARRY OUT 3D CHECKS.
Isolate the high voltage rectifier assembly from the HV circuit. The high voltage rectifier can be tested using an ohmmeter set to its highest range. Connect the ohmmeter across the terminal B+C of the high voltage rectifier and note the reading obtained. Reverse the meter leads and note this second reading. The normal resistance is infinite in one direction and more than $100\ \text{k}\Omega$ in the other direction.
CARRY OUT 4R CHECKS.



NOTE: FOR MEASUREMENT OF THE RESISTANCE OF THE RECTIFIER, THE BATTERIES OF THE MEASURING INSTRUMENT MUST HAVE A VOLTAGE AT LEAST 6 VOLTS, BECAUSE OTHERWISE AN INFINITE RESISTANCE MIGHT BE SHOWN IN BOTH DIRECTIONS.

TEST PROCEDURES

PROCEDURE LETTER

COMPONENT TEST

D

HIGH VOLTAGE CAPACITOR TEST

CARRY OUT 3D CHECKS.

A. Isolate the high voltage capacitor from the circuit.

B. Continuity check must be carried out with measuring instrument which is set to the highest resistance range.

C. A normal capacitor shows continuity for a short time (kick) and then a resistance of about 10MΩ after it has been charged.

D. A short-circuited capacitor shows continuity all the time.

E. An open capacitor constantly shows a resistance about 10 MΩ because of its internal 10MΩ resistance.

F. When the internal wire is opened in the high voltage capacitor shows an infinite resistance.

G. The resistance across all the terminals and the chassis must be infinite when the capacitor is normal.

If incorrect reading are obtained, the high voltage capacitor must be replaced.

CARRY OUT 4R CHECKS.

E

SWITCH TEST

CARRY OUT 3D CHECKS.

Isolate the switch to be tested and using an ohmmeter check between the terminals as described in the following table.

Table: Terminal Connection of Switch

Plunger Operation	COM to NO	COM to NC
Released	Open circuit	Short circuit
Depressed	Short circuit	Open circuit

COM; Common terminal,

NO; Normally open terminal

NC; Normally close terminal

If incorrect readings are obtained, make the necessary switch adjustment or replace the switch.

CARRY OUT 4R CHECKS.

F

FUSE F3, F4 M8A TEST

CARRY OUT 3D CHECKS.

If the fuses F3 and/or F4 M8A are blown, there could be shorts in the high voltage transformers T1 and/ or T2 or there is a ground in wire harness. Check and/ or replace the high voltage transformers T1 and/ or T2 or repair the wire harness.

CARRY OUT 4R CHECKS.

CAUTION: Only replace fuses F3, F4 M8A with the correct value replacement.

G

WEAK POINT F1 TEST

CARRY OUT 3D CHECKS.

If the weak point F1 is blown, there could be a shorts or grounds in electrical parts or wire harness. Check them and replace the defective parts or repair the wire harness.

CARRY OUT 4R CHECKS.

CAUTION: Only replace weak point F1 with the correct value replacement.

H

FUSE F2 F6.3A TEST

CARRY OUT 3D CHECKS.

If the fuse F2 F6.3A is blown when the door is opened, check the 1st. latch switch SW1, monitor switch SW4 and monitor resistor R1.

If the fuse F2 F6.3A is blown by incorrect door switching replace the defective switch(s) and the fuse F2 F6.3A.

CARRY OUT 4R CHECKS.

CAUTION: Only replace fuse F2 F6.3A with the correct value replacement.

TEST PROCEDURES

PROCEDURE LETTER

COMPONENT TEST

I

TEMPERATURE FUSE TEST

1. CARRY OUT 3D CHECKS.

2. A continuity check across the temperature fuse terminals should indicate a closed circuit unless the temperature of the temperature fuse reaches specified temperature as shown below.

	Open temperature	Close temperature	Display or Condition	Check point
Magnetron temperature fuse TF1	150°C	Non resetable type	EE1	Magnetron MG1 Failure: Test magnetron MG1 and Blower fan motor.
Magnetron temperature fuse TF2			EE3	Magnetron MG1, MG2 Failure: Test magnetron MG1, MG2. Check blower fan motor and ventilation opening.
			EE2	Magnetron MG2 Failure: Test magnetron MG2 and Blower fan motor.
Blower motor temperature fuse TF3	120°C	Non resetable type	Oven shut off	Check blower fan motor and ventilation opening or rocked rotating of blower fan motor.
Oven temperature fuse TF4	120°C	Non resetable type	Oven shut off	Food has been burned in oven. Temperature of oven inside is very high.

3. CARRY OUT 4R CHECKS.

CAUTION: IF THE temperature fuse INDICATES AN OPEN CIRCUIT AT ROOM TEMPERATURE REPLACE temperature fuse.

J

MONITOR RESISTOR R1 TEST

CARRY OUT 3D CHECKS.

Disconnect the leads from the monitor resistor R1. Using an ohmmeter and set on a low range. Check between the terminals of the monitor resistor R1.

The resistance of monitor resistor R1 should be read approx. 4.3Ω.

If incorrect readings are obtained, replace the monitor resistor R1.

CARRY OUT 4R CHECKS.

K

THERMISTOR TEST

1. CARRY OUT 3D CHECKS.

2. Follow the procedures below for each thermistor.

2-1. MAGNETRON THERMISTOR TEST

Disconnect the connector of the magnetron thermistor from the switch harness. Measure the resistance of the magnetron thermistor with an ohmmeter. Connect the ohmmeter leads to the leads of the thermistor.

Room Temp.	59°F (15°C)	68°F (20°C)	77°F (25°C)
Resistance	Approx. 373 kΩ	Approx. 292 kΩ	Approx. 231 kΩ

If the meter does not indicate above resistance, replace the thermistor.

2-2. OVEN THERMISTOR (1) TEST

Disconnect the connector of the oven thermistor (1) from the switch harness. Measure the resistance of the oven thermistor (1) with an ohmmeter. Connect the ohmmeter leads to the leads of the thermistor.

Room Temp.	59°F (15°C)	68°F (20°C)	77°F (25°C)
Resistance	Approx. 373 kΩ	Approx. 292 kΩ	Approx. 231 kΩ

If the meter does not indicate above resistance, replace the thermistor.

2-3. OVEN THERMISTOR (2) TEST

Disconnect the two connectors of the magnetron thermistor and oven thermistor (2) from the switch harness. Measure the resistance of the oven thermistor (2) with an ohmmeter. Connect the ohmmeter leads to the leads of the thermistor.

TEST PROCEDURES

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Room Temp.	59°F (15°C)	68°F (20°C)	77°F (25°C)
Resistance	Approx. 16 kΩ	Approx. 13 kΩ	Approx. 11 kΩ

If the meter does not indicate above resistance, replace the thermistor.

3. CARRY OUT 4R CHECKS.

L MOTOR WINDING TEST

CARRY OUT 3D CHECKS.

Disconnect the leads from the motor. Using an ohmmeter, check the resistance between the two terminals.

Resistance of Blower motor should be approximately 52Ω.

Resistance of Stirrer motor should be approximately 8.8 kΩ.

If incorrect readings are obtained, replace the motor.

CARRY OUT 4R CHECKS.

M NOISE FILTER TEST

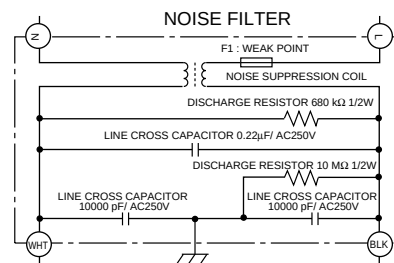
CARRY OUT 3D CHECKS.

Disconnect the leads from the terminals of noise filter. Using an ohmmeter, check between the terminals as described in the following table.

MEASURING POINT	INDICATION OF OHMMETER
Between N and L	Approx. 680 kΩ
Between terminal N and WHIT	Short circuit
Between terminal L and BLK	Short circuit

If incorrect readings are absorbed, replace the noise filter.

CARRY OUT 4R CHECKS.

**N HIGH VOLTAGE FUSE TEST**

CARRY OUT 3D CHECKS.

If the high voltage fuse is blown, there could be a short in the high voltage rectifier or the magnetron. Check them and replace the defective parts and the high voltage fuse.

CARRY OUT 4R CHECKS.

CAUTION: Only replace high voltage fuse with the correct value replacement.

O TOUCH CONTROL PANEL ASSEMBLY TEST FOR R-23AT

The touch control panel consists of circuits including semiconductors such as LSI, IC, etc. Therefore, unlike conventional microwave ovens, proper maintenance cannot be performed with only a voltmeter and ohmmeter. In this service manual, the touch control panel assembly is divided into two units, Control Unit and Key Unit, troubleshooting by unit replacement is described according to the symptoms indicated.

1. Key Unit Note : Check key unit ribbon connection before replacement.

The following symptoms indicate a defective key unit. Replace the key unit.

- When touching the pads, a certain pad produces no signal at all.
- When touching the pads, sometimes a pad produces no signal.

2. Control Unit

The following symptoms may indicate a defective control unit. Replacing the control unit. Before replacing the control unit, perform the key unit test (Procedure P) to determine if control unit is faulty.

2-1 Programming problems.

- When touching the pads, a certain group of pads do not produce a signal.

TEST PROCEDURES

PROCEDURE LETTER	COMPONENT TEST
2-2	Display problems. a) For a certain digit, all or some segments do not light up. b) For a certain digit, brightness is low. c) Only one indicator does not light. d) The corresponding segments of all digits do not light up; or they continue to light up. e) Wrong figure appears. f) A certain group of indicators do not light up. g) The figure of all digits flicker.
2-3	Other possible problems caused by defective control unit. a) Buzzer does not sound or continues to sound. b) Cooking is not possible.

CONTROL PANEL ASSEMBLY TEST FOR R-23AM / R-22AM

The control panel consists of circuits including semiconductors such as LSI etc. Therefore, unlike conventional microwave ovens, proper maintenance cannot be performed with only a voltmeter and ohmmeter. In this service manual, the touch control panel assembly is divided into three units, Control Unit, Switch Unit and Encoder Unit troubleshooting by unit replacement is described according to the symptoms indicated.

1. Switch Unit Note : Check the lead wire harness connections among big and small switch units and control unit before replacement.

The following symptoms indicate a defective switch unit. Replace the switch unit.

- a) When touching the buttons, a certain button produces no signal at all.
- b) When touching the buttons, sometimes a button produces no signal.

2. Encoder Note : Check the lead wire connection between encoder and control unit before replacement.

The following symptoms indicate a defective encoder. Replace the encoder.

- a) When rotating the encoder, the cooking time can not be entered.

3. Control Unit

The following symptoms may indicate a defective control unit. Replacing the control unit. Before replacing the control unit, perform the switch unit test (Procedure P) to determine if control unit is faulty.

- 3-1 Programming problems.

- a) When touching the buttons, a certain group of buttons do not produce a signal.

- 3-2 Display problems.

- a) For a certain digit, all or some segments do not light up.
- b) For a certain digit, brightness is low.
- c) Only one indicator does not light.
- d) The corresponding segments of all digits do not light up; or they continue to light up.
- e) Wrong figure appears.
- f) A certain group of indicators do not light up.
- g) The figure of all digits flicker.

- 3-3 Other possible problems caused by defective control unit.

- a) Buzzer does not sound or continues to sound.
- b) Cooking is not possible.

P**KEY UNIT TEST FOR R-23AT**

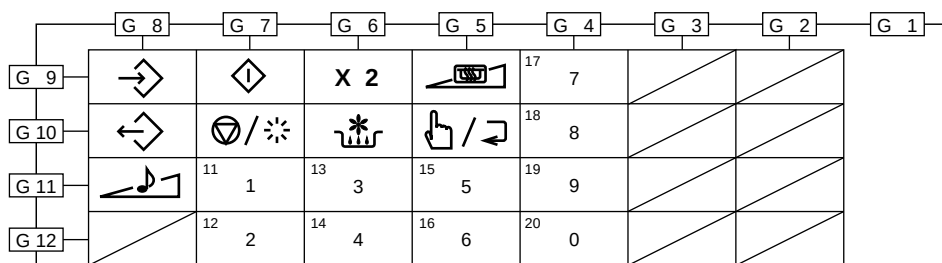
CARRY OUT 3D CHECKS.

If the display fails to clear when the STOP/CLEAR pad is depressed, first verify the flat ribbon cable is making good contact, verify that the door sensing switch (stop switch) operates properly; that is the contacts are closed when the door is closed and open when the door is open. If the door sensing switch (stop switch) is good, disconnect the flat ribbon cable that connects the key unit to the control unit and make sure the door sensing switch is closed (either close the door or short the stop switch connector). Use the key unit matrix indicated on the control panel schematic and place a jumper wire between the pins that correspond to the STOP/CLEAR pad making momentary contact. If the control unit responds by clearing with a beep, the key unit is faulty and must be replaced. If the control unit does not respond, it is faulty and must be replaced. If a specific pad does not respond, the above method may be used (after clearing the control unit) to determine if the control unit or key pad is at fault.

TEST PROCEDURES

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COMPONENT TEST



CARRY OUT 4R CHECKS.

SWITCH UNIT TEST FOR R-23AM / R-22AM

1. CARRY OUT 3D CHECKS.
2. Remove the switch unit from the control panel, referring to control panel removal.
3. To test the switches (SW1-SW5) on the switch unit, check between the terminals of the connector CN-F as described in the following table by using ohmmeter when the switches are released and depressed.

Switches	Terminals	Released	Depressed
SW1	F1 - F4	O.C.	S.C.
SW2	F1 - F5	O.C.	S.C.
SW3	F2 - F4	O.C.	S.C.
SW4	F2 - F5	O.C.	S.C.
SW5	F3 - F4	O.C.	S.C.

4. If incorrect readings are obtained, replace the defective switch.
5. CARRY OUT 4R CHECKS.

Q

RELAY TEST

CARRY OUT 3D CHECKS.

Remove the outer case and check voltage between Pin Nos. 5 and 7 of the connector (A) on the control unit with an A.C. voltmeter. The meter should indicate 230 volts, if not check control unit circuitry.

RY1, RY3 and RY4 Relay Test For R-23AT

These relays are operated by D.C. voltage.

Check voltage at the relay coil with a D.C. voltmeter during the microwave cooking operation.

DC. voltage indicated Defective relay.

DC. voltage not indicated Check diode which is connected to the relay coil. If diode is good, control unit is defective.

RELAY SYMBOL	OPERATIONAL VOLTAGE	CONNECTED COMPONENTS
RY1	APPROX. 19.0V D.C.	Oven lamp, Blower motor and Stirrer motors
RY3	APPROX. 16.0V D.C.	High voltage transformer 1
RY4	APPROX. 18.0V D.C.	High voltage transformer 2

RY1, RY2 and RY3 Relay Test For R-23AM / R-22AM

These relays are operated by D.C. voltage.

Check voltage at the relay coil with a D.C. voltmeter during the microwave cooking operation.

DC. voltage indicated Defective relay.

DC. voltage not indicated Check diode which is connected to the relay coil. If diode is good, control unit is defective.

TEST PROCEDURES

PROCEDURE LETTER	COMPONENT TEST
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RELAY SYMBOL	OPERATIONAL VOLTAGE	CONNECTED COMPONENTS
RY1	APPROX. 18.0V D.C.	Oven lamp, Blower motor and Stirrer motors
RY2	APPROX. 17.5V D.C.	High voltage transformer 1
RY3	APPROX. 17.5V D.C.	High voltage transformer 2

CARRY OUT 4R CHECKS.

R PROCEDURES TO BE TAKEN WHEN THE FOIL PATTERN ON THE PRINTED WIRING BOARD(PWB) IS OPEN

To protect the electronic circuits, this model is provided with a fine foil pattern added to the primary on the PWB, this foil pattern acts as a fuse. If the foil pattern is open, follow the troubleshooting guide given below for repair.

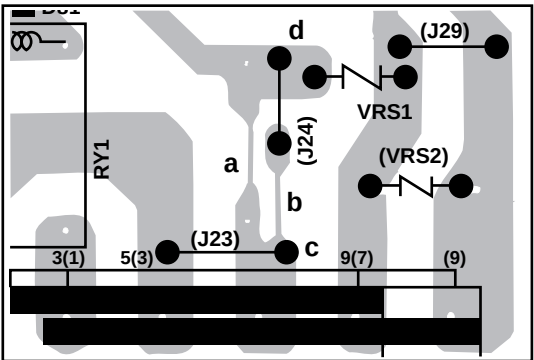
Problem: POWER ON, indicator does not light up.

CARRY OUT 3D CHECKS.

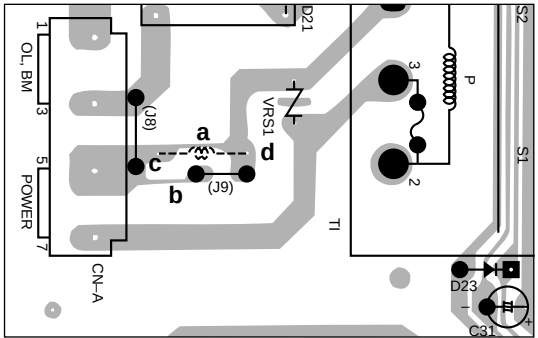
STEPS	OCCURRENCE	CAUSE OR CORRECTION
1	The rated AC voltage is not present at POWER terminal of CPU connector (CN-A).	Check supply voltage and oven power cord.
2	The rated AC voltage is present at primary side of low voltage transformer.	Low voltage transformer or secondary circuit defective. Check and repair.
3	Only pattern at "a" is broken.	*Insert jumper wire J24 and solder for R-23AT. *Insert jumper wire J9 and solder for R-23AM / R-22AM. (CARRY OUT <u>3D</u> CHECKS BEFORE REPAIR)
4	Pattern at "a" and "b" are broken.	*Insert the coil RCILF2003YAZZ between "c" and "d". (CARRY OUT <u>3D</u> CHECKS BEFORE REPAIR)

NOTE: *At the time of these repairs, make a visual inspection of the varistor for burning damage and examine the transformer with tester for the presence of layer short-circuit (check primary coil resistance). If any abnormal condition is detected, replace the defective parts.

CARRY OUT 4R CHECKS.



R-23AT



R-23AM / R-22AM

TOUCH CONTROL PANEL ASSEMBLY FOR R-23AT

OUTLINE OF TOUCH CONTROL PANEL

The touch control section consists of the following units as shown in the touch control panel circuit.

- (1) Control Unit
- (2) Key Unit

The principal functions of these units and the signals communicated among them are explained below.

1. Control Unit

Signal of key touch and oven function control are all processed by one microcomputer.

1) Power Supply Circuit

This circuit changes output voltage at the secondary side of the low voltage (T1) transformer to voltages required at each part by full wave rectifying circuit, constant voltage circuit, etc..

2) ACL Circuit

This is an Auto-clear Circuit, i.e., a reset circuit, which enables IC1 to be activated from initial state.

3) Power Synchronizing Signal Generating Circuit

This is a circuit for generating power synchronizing signal by virtue of the secondary side output of transformer T1.

This signal is used for a basic frequency to time processing and so on.

4) Clock Circuit

This is a circuit for controlling clock frequency required for operating IC1.

5) IC1 (Main Processor)

This is a one-chip microcomputer, responsible for controlling the entire control unit.

6) IC2 (Memory Processor)

This is a memory IC, responsible for memory function.

7) Display Circuit

This is a circuit for driving display tubes by IC1 output.

8) Key Input Circuit

This is a circuit for transmitting key input information to IC1.

9) Sound-body Driving Circuit

This is a circuit for driving sound body by IC1 output.

10) Relay Driving Circuit

This is a circuit for driving output relay by IC1 output.

11) Stop Switch Circuit

This is a circuit for driving IC1 to detect door opening/closing.

12) Exhaust Air Temperature Detecting Circuit

This is a circuit for transmitting output change of thermistor (Oven thermistor (1)) to IC1.

13) High Voltage Monitoring Circuit.

This circuit detects problems in the magnetron / high voltage circuit by sensing a variation in the current flowing through the primary winding of the high voltage transformer.

During heating, the primary current of the high voltage transformers also flows through the primary winding of the current transformers CT1 and CT2. This causes a current to be induced in the secondary windings of CT1/CT2 and results in an

AC voltage which is determined by R61/R62.

This AC voltage is then half wave rectified by D61/D62 and smoothed (filtered) by C61/C62.

This AC voltage is the input to the IN3 and IN5 ports of IC1, which determines if there is a magnetron / high voltage problem.

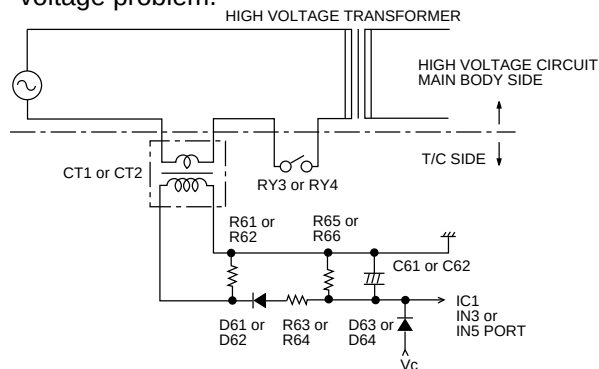


Figure T-1. High Voltage Monitoring Circuit For R-23AT

14) Magnetron Temperature Circuit.

(Detect Noload or Fan Lock)

This is a circuit for transmitting output change of thermistor (Magnetron thermistor) to IC1.

15) Oven Cavity Temperature Detecting Circuit.

This is a circuit for transmitting output change of thermistor (Oven thermistor (2)) to IC1.

2. Key Unit

The key unit is composed of a matrix circuit in which when a key is touched, one of signals P11, P12, P15, P16 and P17 generated by the LSI, is passed through the key and returned to the LSI as one of signals R0-R3. This model has 20 Memory pads. When the oven is shipped, Memory pad 1 to 10 are set as follows: fig.1.

Memory No.	Cook Time	Output Power
1	5 sec.	100%
2	10 sec.	100%
3	20 sec.	100%
4	30 sec.	100%
5	40 sec.	100%
6	50 sec.	100%
7	1 min.	100%
8	1 min.15 sec.	100%
9	1 min.30 sec.	100%
10	2 mins.	100%

(fig. 1)

This model has a double quantity pad. When the oven is shipped, Magnification "1.8" is preset in the double quantity pad. This model has an defrost pad. When the oven is shipped, defrost is set as follows: fig.2.

	1STAGE	2STAGE	3STAGE
POWER	50%	30%	20%
DEFROSTING TIME	0.2T+20sec.	0.13T+30sec.	0.67T-50sec.

(fig. 2)

NOTE :

"CHECK" indicator will flash at half of defrosting time.

CONTROL PANEL ASSEMBLY FOR R-23AM / R-22AM

OUTLINE OF CONTROL PANEL

The control section consists of the following units as shown in the control panel circuit.

- (1) Control Unit
- (2) Switch Unit
- (3) Encoder Unit

The principal functions of these units and the signals communicated among them are explained below.

1. Control Unit

Signal of switch touch and oven function control are all processed by one microcomputer.

1) Power Supply Circuit

This circuit changes output voltage at the secondary side of the low voltage (T1) transformer to voltages required at each part by full wave rectifying circuit, constant voltage circuit, etc..

2) ACL Circuit

This is an Auto-clear Circuit, i.e., a reset circuit, which enables IC1 to be activated from initial state.

3) Power Synchronizing Signal Generating Circuit

This is a circuit for generating power synchronizing signal by virtue of the secondary side output of transformer T1.

This signal is used for a basic frequency to time processing and so on.

4) Clock Circuit

This is a circuit for controlling clock frequency required for operating IC1.

5) IC1 (Main Processor)

This is a one-chip microcomputer, responsible for controlling the entire control unit.

6) Display Circuit

This is a circuit for driving display tubes by IC1 output.

7) Switch Input Circuit

This is a circuit for transmitting switch input information to IC1.

8) Sound-body Driving Circuit

This is a circuit for driving sound body by IC1 output.

9) Relay Driving Circuit

This is a circuit for driving output relay by IC1 output.

10) Stop Switch Circuit

This is a circuit for driving IC1 to detect door opening/closing.

11) Exhaust Air Temperature Detecting Circuit

This is a circuit for transmitting output change of thermistor (Oven thermistor (1)) to IC1.

12) High Voltage Monitoring Circuit.

This circuit detects problems in the magnetron / high voltage circuit by sensing a variation in the current flowing through the primary winding of the high voltage transformer.

During heating, the primary current of the high voltage transformers also flows through the primary winding of the current transformers CT1 and CT2. This causes a current to be induced in the secondary windings of CT1/CT2 and results in an AC voltage which is determined by R30/R31.

This AC voltage is then half wave rectified by D30/D31 and smoothed (filtered) by C30/C31.

This AC voltage is the input to the AN3 and AN4 ports of IC1, which determines if there is a magnetron / high voltage problem.

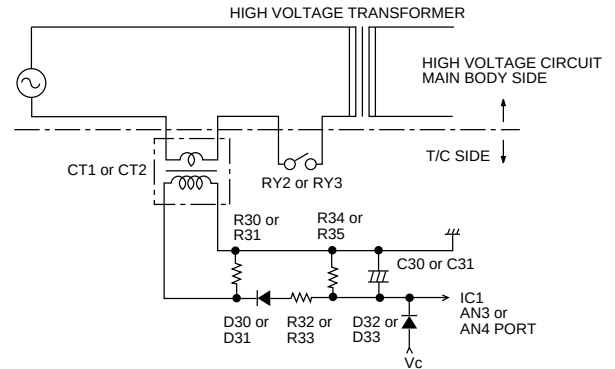


Figure T-1. High Voltage Monitoring Circuit For R-23AM / R-22AM

13) Magnetron Temperature Detecting Circuit.

This is a circuit for transmitting output change of thermistor (Magnetron thermistor) to IC1.

14) Oven Cavity Temperature Detecting Circuit.

This is a circuit for transmitting output change of thermistor (Oven thermistor (2)) to IC1.

2. Switch Unit

The switch unit is composed of a matrix circuit in which when a switch is touched, one of signals P43 - P45 generated by the LSI, is passed through the switch and returned to the LSI as one of signals P50 - P51.

3. Encoder

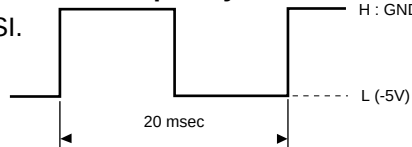
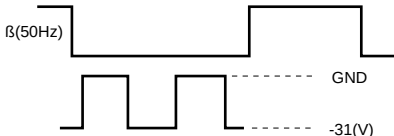
The encoder converts the signal generated by LSI into the pulse signal, and the pulse signal is returned to the LSI.

DESCRIPTION OF LSI FOR R-23AT

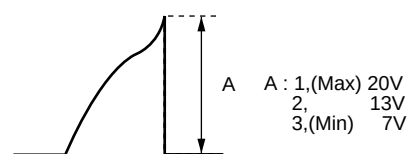
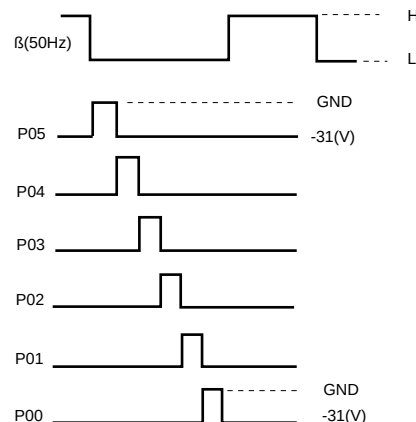
LSI(IZA646DR)

The I/O signal of the LSI(IZA646DR) is detailed in the following table.

Pin No.	Signal	I/O	Description																																										
1	VREF	IN	Reference voltage input terminal. A reference voltage applied to the A/D converter in the LSI. Connected to GND.(0V)																																										
2	IN7	IN	Temperature measurement input: MAGNETRON THERMISTOR AND OVEN THERMISTOR (2). By inputting DC voltage corresponding to the temperature detected by the thermistor, this input is converted into temperature by the A/D converter built into the LSI.																																										
3	IN6	IN	Temperature measurement input: OVEN THERMISTOR (1). By inputting DC voltage corresponding to the temperature detected by the thermistor, this input is converted into temperature by the A/D converter built into the LSI.																																										
4	IN5	IN	A/D input for troubleshooting Magnetron 1.																																										
5	IN4	IN	Terminal to change functions according to the model. Signal in accordance with the model in operation is applied to set up its function.																																										
6	IN3	IN	A/D input for troubleshooting Magnetron 2.																																										
7	IN2	IN	Connected to GND.(0V)																																										
8	IN1	IN	Terminal not used.																																										
9	IN0	IN	Connected to VC.																																										
10	P47	OUT	Terminal not used.																																										
11	P46	OUT	Memory (EEPROM) clock output.																																										
12	P45	IN/OUT	Memory (EEPROM) data input/output.																																										
13-14	P44-P43	OUT	Magnetron high-voltage circuit driving signal. To turn on and off the cook relay. In 100% power level operation, "L" level during cooking; "H" level otherwise. In other power level operation (90, 80, 70, 60, 50, 40, 30, 20, 10 or 0%), "H" and "L" level is repeated according to power level. <table><tr><td>Power level</td><td>ON</td><td>OFF</td><td>Power level</td><td>ON</td><td>OFF</td></tr><tr><td>100%</td><td>48sec.</td><td>0sec.</td><td>40%</td><td>22sec.</td><td>26sec.</td></tr><tr><td>90%</td><td>44sec.</td><td>4sec.</td><td>30%</td><td>16sec.</td><td>32sec.</td></tr><tr><td>80%</td><td>40sec.</td><td>8sec.</td><td>20%</td><td>12sec.</td><td>36sec.</td></tr><tr><td>70%</td><td>36sec.</td><td>12sec.</td><td>10%</td><td>8sec.</td><td>40sec.</td></tr><tr><td>60%</td><td>32sec.</td><td>16sec.</td><td>0%</td><td>0sec.</td><td>48sec.</td></tr><tr><td>50%</td><td>26sec.</td><td>22sec.</td><td></td><td></td><td></td></tr></table>	Power level	ON	OFF	Power level	ON	OFF	100%	48sec.	0sec.	40%	22sec.	26sec.	90%	44sec.	4sec.	30%	16sec.	32sec.	80%	40sec.	8sec.	20%	12sec.	36sec.	70%	36sec.	12sec.	10%	8sec.	40sec.	60%	32sec.	16sec.	0%	0sec.	48sec.	50%	26sec.	22sec.			
Power level	ON	OFF	Power level	ON	OFF																																								
100%	48sec.	0sec.	40%	22sec.	26sec.																																								
90%	44sec.	4sec.	30%	16sec.	32sec.																																								
80%	40sec.	8sec.	20%	12sec.	36sec.																																								
70%	36sec.	12sec.	10%	8sec.	40sec.																																								
60%	32sec.	16sec.	0%	0sec.	48sec.																																								
50%	26sec.	22sec.																																											
15	P42	OUT	Power supply output at thermistor detecting circuit. (Output -5V in cooking only, but apply high impedance to others to prevent thermistor from electrolytic corrosion occurrence.)																																										
16	P41	OUT	Terminal not used.																																										
17	P40	OUT	Oven lamp, Blower motor and Stirrer motors driving signal. (Square Waveform : 50Hz) To turn on and off the shut-off relay (RY1). The Square waveform voltage is delivered to the RY1 relay driving circuit and relays(RY3, RY4, COOK RELAY) control circuit.																																										
18-22	P37-P33	OUT	Terminal not used.																																										
23	P32	OUT	Signal to sound buzzer. This signal is to control the 2.5kHz continuous signal. A: key touch sound. B: Guidance sound. C: Completion sound.																																										

Pin No.	Signal	I/O	Description																												
24	P31	IN	Signal synchronized with commercial power source frequency. This is basic timing for all time processing of LSI. 																												
25	P30	OUT	Terminal not used.																												
26	CNVSS	IN	Connected to Vc.(-5V)																												
27	RESET	IN	Auto clear terminal. Signal is input to reset the LSI to the initial state when power is supplied. Temporarily set to "L" level the moment power is supplied, at this time the LSI is reset. Thereafter set at "H" level.																												
28	XIN	IN	Internal clock oscillation frequency setting input. The internal clock frequency is set by inserting the ceramic filter oscillation circuit with respect to XOUT terminal.																												
29	XOUT	OUT	Internal clock oscillation frequency control output. Output to control oscillation input of XIN.																												
30/31	XCIN/XCOUT	IN/OUT	Terminal not used.																												
32	VSS	IN	Power source voltage: -5V. VC voltage of power source circuit input.																												
33	∅	OUT	Terminal not used.																												
34	R3	IN	Signal coming from touch key. When either one of G-12 line keys on key matrix is touched, a corresponding signal out of P11, P12, P14 - P17 will be input into R3. When no key is touched, the signal is held at "L" level.																												
35	R2	IN	Signal similar to R3. When either one of G-11 line keys on key matrix is touched, a corresponding signal will be input into R2.																												
36	R1	IN	Signal similar to R3. When either one of G-10 line keys on key matrix is touched, a corresponding signal will be input into R1.																												
37	R0	IN	Signal similar to R3. When either one of G-9 line keys on key matrix is touched, a corresponding signal will be input into R0.																												
38	VP	IN	Anode (segment) of Fluorescent Display light-up voltage: -31V. Vp voltage of power source circuit input.																												
39	P17	OUT	Segment data signal. The relation between signals and indicators are as follows: <table border="0"> <tr> <td>Signal</td><td>Segment</td><td>Signal</td><td>Segment</td></tr> <tr> <td>P24</td><td>i</td><td>P13</td><td>f</td></tr> <tr> <td>P23</td><td>j,k</td><td>P12</td><td>e</td></tr> <tr> <td>P17</td><td>LB</td><td>P11</td><td>d</td></tr> <tr> <td>P16</td><td>UB</td><td>P10</td><td>c</td></tr> <tr> <td>P15</td><td>h</td><td>P07</td><td>b</td></tr> <tr> <td>P14</td><td>g</td><td>P06</td><td>a</td></tr> </table>  Key strobe signal. Signal applied to touch-key section. A pulse signal is input to R0 - R3 terminal while one of G-6 line keys on key matrix is touched.	Signal	Segment	Signal	Segment	P24	i	P13	f	P23	j,k	P12	e	P17	LB	P11	d	P16	UB	P10	c	P15	h	P07	b	P14	g	P06	a
Signal	Segment	Signal	Segment																												
P24	i	P13	f																												
P23	j,k	P12	e																												
P17	LB	P11	d																												
P16	UB	P10	c																												
P15	h	P07	b																												
P14	g	P06	a																												
40	P16	OUT	Segment data signal. Signal similar to P17. Key strobe signal. Signal applied to touch-key section. A pulse signal is input to R0 - R3 terminal while one of G-5 line keys on key matrix is touched.																												
41	P15	OUT	Segment data signal. Signal similar to P17. Key strobe signal. Signal applied to touch-key section. A pulse signal is input to R0 - R3 terminal while one of G-4 line keys on key matrix is touched.																												

Pin No.	Signal	I/O	Description												
42-43	P14-P13	OUT	<u>Segment data signal.</u> Signal similar to P17.												
44	P12	OUT	<u>Segment data signal.</u> Signal similar to P17. <u>Key strobe signal.</u> Signal applied to touch-key section. A pulse signal is input to R0 - R3 terminal while one of G-8 line keys on key matrix is touched.												
45	P11	OUT	<u>Segment data signal.</u> Signal similar to P17. <u>Key strobe signal.</u> Signal applied to touch-key section. A pulse signal is input to R0 - R3 terminal while one of G-7 line keys on key matrix is touched.												
46	P10	OUT	<u>Segment data signal.</u> Signal similar to P17.												
47-48	P07-P06	OUT	<u>Segment data signal.</u> Signal similar to P17.												
49	P05	OUT	<u>Digit selection signal.</u> The relation between digit signal and digit are as follows: Digit signal Digit P05 1st. P04 2nd. P03 3rd. P02 4th. P01 5th. P00 6th. Normally, one pulse is output in every β period, and input to the grid of the Fluorescent Display.												
50-54	P04-P00	OUT	<u>Digit selection signal.</u> Signal similar to P16.												
55-57	P27-P25	OUT	Terminal not used.												
58-59	P24-P23	OUT	<u>Segment data signal.</u> Signal similar to P17.												
60	P22	OUT	<u>(Sound) Voltage level control terminal.</u> This terminal (P22) is to control volume level of buzzer sound with terminals P21. Since the volume level of buzzer sound depends on voltage energized, it is control level in 3 steps by combining signal levels for P22, P21. Relationship of signal level combination to sound volume level is shown in the following table, 1~3 in the table, however, are indicated in the descending order from the maximum level of sound volume through the minimum level. <table><tr><th>Sound Volume</th><th>P21</th><th>P22</th></tr><tr><td>1, (Max.)</td><td>L</td><td>L</td></tr><tr><td>2,</td><td>H</td><td>L</td></tr><tr><td>3, (Min.)</td><td>L</td><td>H</td></tr></table> *At Output terminal P32, rectangular wave signal of 2.5kHz is output.	Sound Volume	P21	P22	1, (Max.)	L	L	2,	H	L	3, (Min.)	L	H
Sound Volume	P21	P22													
1, (Max.)	L	L													
2,	H	L													
3, (Min.)	L	H													
61	P21	OUT	<u>Sound level control signal.</u> Refer to above signal P22.												
62	P20	IN	<u>Input signal which communicates the door open/close information to LSI.</u> Door closed; "H" level signal(0V). Door opened; "L" level signal(-31.0V).												
63/64	AVCC/VCC	IN	Connected to GND.												

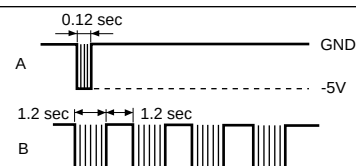


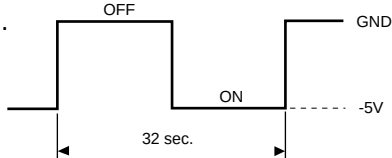
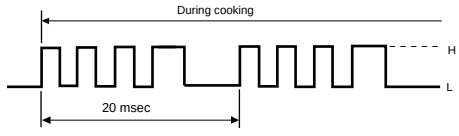
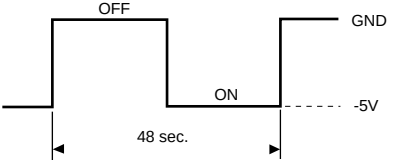
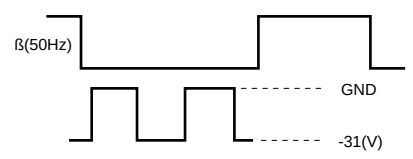
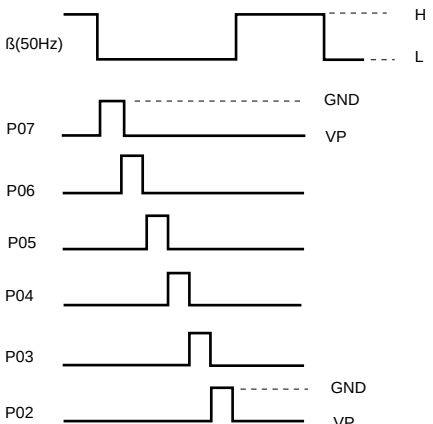
DESCRIPTION OF LSI FOR R-23AM / R-22AM

LSI(IZA648DR)

The I/O signal of the LSI(IZA648DR) is detailed in the following table.

Pin No.	Signal	I/O	Description
1	VCC	IN	Connected to GND.
2	VEE	IN	Anode (segment) of Fluorescent Display light-up voltage: -35V. Vp voltage of power source circuit input.
3	AVSS	IN	Reference voltage input terminal. A reference voltage applied to the A/D converter in the LSI. Connected to DC. (-5V)
4	VREF	IN	Reference voltage input terminal. A reference voltage applied to the A/D converter in the LSI. Connected to GND.
5-6	AN7-AN6	IN	Terminal to switch the specification.
7	AN5	IN	Connected to GND.
8	AN4	IN	A/D input for troubleshooting Magnetron 1.
9	AN3	IN	A/D input for troubleshooting Magnetron 2.
10	AN2	IN	Temperature measurement input: OVEN THERMISTOR (1). By inputting DC voltage corresponding to the temperature detected by the thermistor, this input is converted into temperature by the A/D converter built into the LSI.
11	AN1	IN	Temperature measurement input: MAGNETRON THERMISTOR AND OVEN THERMISTOR (2). By inputting DC voltage corresponding to the temperature detected by the thermistor, this input is converted into temperature by the A/D converter built into the LSI.
12	P60	IN	Input signal which communicates the door open/close information to LSI. Door closed; "H" level signal (0V). Door opened; "L" level signal (-5.0V).
13	P55	OUT	Power supply output at thermistor detecting circuit. (Output -5V in cooking only, but apply high impedance to others to prevent thermistor from electrolytic corrosion occurrence.)
14-16	P54-P52	OUT	Terminal not used.
17	P51	IN	Signal coming from switch unit. When either one of switches SW2 and SW4 on the switch unit is pressed, a corresponding signal out of P44 and P43 will be input into P51.
18	P50	IN	Signal similar to P51. When either one of switches SW1, SW3 and SW5 on the switch unit is pressed, a corresponding signal out of P43, P44 and P45 will be input into P50.
19	P47	OUT	Signal to sound buzzer. This signal is to control the 2.5kHz continuous signal. A: Switch touch sound. B: Completion sound.
20	P46	OUT	Terminal not used.
21	P45	OUT	Switch strobe signal. Signal is applied to the switch unit. A pulse signal is input to P50 terminal while switch SW5 is pressed.
22	P44	OUT	Switch strobe signal. Signal is applied to the switch unit. A pulse signal is input to P50 or P51 terminal while switch SW3 or SW4 is pressed.
23	P43	OUT	Switch strobe signal. Signal is applied to the switch unit. A pulse signal is input to P50 or P51 terminal while switch SW1 or SW2 is pressed.
24	P42	IN	Signal coming from encoder. When the encoder is turned, the contacts of encoder make pulse signals. And pulse signals are input into P42.
25	INT1	IN	Signal coming from encoder. Signal similar to R42. Pulse signals are input into INT1.



Pin No.	Signal	I/O	Description																												
26	INT0	IN	Signal synchronized with commercial power source frequency. This is basic timing for all time processing of LSI. 																												
27	RESET	IN	Auto clear terminal. Signal is input to reset the LSI to the initial state when power is supplied. Temporarily set to "L" level the moment power is supplied, at this time the LSI is reset. Thereafter set at "H" level.																												
28-29	P71-P70	OUT	Terminal not used.																												
30	XIN	IN	Internal clock oscillation frequency setting input. The internal clock frequency is set by inserting the ceramic filter oscillation circuit with respect to XOUT terminal.																												
31	XOUT	OUT	Internal clock oscillation frequency control output. Output to control oscillation input of XIN.																												
32	VSS	IN	Power source voltage: -5V. VC voltage of power source circuit input.																												
33	P27	OUT	Oven lamp, Blower motor and Stirrer motor driving signal (Square Waveform : 50Hz). To turn on and off the shut-off relay (RY1). The Square waveform voltage is delivered to the RY1 relay driving circuit and relays (RY2, RY3, COOK RELAY) control circuit. 																												
34	P26	OUT	Terminal not used.																												
35-36	P25-P24	OUT	Magnetron high-voltage circuit driving signal. To turn on and off the cook relay. In100% power level operation, "L" level during cooking; "H" level otherwise. In other power level operation (50, 20 or 10%), "H" and "L" level is repeated according to power level. <table><tr><th>POWER LEVEL</th><th>ON</th><th>OFF</th></tr><tr><td>50%</td><td>26sec.</td><td>22sec.</td></tr><tr><td>20%</td><td>12sec.</td><td>36sec.</td></tr><tr><td>10%</td><td>8sec.</td><td>40sec.</td></tr></table> 	POWER LEVEL	ON	OFF	50%	26sec.	22sec.	20%	12sec.	36sec.	10%	8sec.	40sec.																
POWER LEVEL	ON	OFF																													
50%	26sec.	22sec.																													
20%	12sec.	36sec.																													
10%	8sec.	40sec.																													
37-38	P23-P22	OUT	Terminal not used.																												
39-48	P21-P10	OUT	Segment data signal. The relation between signals and indicators are as follows: <table><tr><th>Signal</th><th>Segment</th><th>Signal</th><th>Segment</th></tr><tr><td>P01.....</td><td>i</td><td>P15.....</td><td>f</td></tr><tr><td>P00.....</td><td>j, k</td><td>P14.....</td><td>e</td></tr><tr><td>P21.....</td><td>LB</td><td>P13.....</td><td>d</td></tr><tr><td>P20.....</td><td>UB</td><td>P12.....</td><td>c</td></tr><tr><td>P17.....</td><td>h</td><td>P11.....</td><td>b</td></tr><tr><td>P16.....</td><td>g</td><td>P10.....</td><td>a</td></tr></table> 	Signal	Segment	Signal	Segment	P01.....	i	P15.....	f	P00.....	j, k	P14.....	e	P21.....	LB	P13.....	d	P20.....	UB	P12.....	c	P17.....	h	P11.....	b	P16.....	g	P10.....	a
Signal	Segment	Signal	Segment																												
P01.....	i	P15.....	f																												
P00.....	j, k	P14.....	e																												
P21.....	LB	P13.....	d																												
P20.....	UB	P12.....	c																												
P17.....	h	P11.....	b																												
P16.....	g	P10.....	a																												
49-54	P07-P02	OUT	Digit selection signal. The relation between digit signal and digit are as follows: <table><tr><th>Digit signal</th><th>Digit</th></tr><tr><td>P07.....</td><td>1st.</td></tr><tr><td>P06.....</td><td>2nd.</td></tr><tr><td>P05.....</td><td>3rd.</td></tr><tr><td>P04.....</td><td>4th.</td></tr><tr><td>P03.....</td><td>5th.</td></tr><tr><td>P02.....</td><td>6th.</td></tr></table>  Normally, one pulse is output in every β period, and input to the grid of the Fluorescent Display.	Digit signal	Digit	P07.....	1st.	P06.....	2nd.	P05.....	3rd.	P04.....	4th.	P03.....	5th.	P02.....	6th.														
Digit signal	Digit																														
P07.....	1st.																														
P06.....	2nd.																														
P05.....	3rd.																														
P04.....	4th.																														
P03.....	5th.																														
P02.....	6th.																														

Pin No.	Signal	I/O	Description
55-56	P01-P00	OUT	Segment data signal. Signal similar to P21.
57-64	P37-P30	OUT	Terminal not used.

2-2 Memory IC (IC2) FOR R-23AT

AT24C04 is a 4K-bit, serial memory, enabling CMOS to be erased/written electrically. This memory is constructed with 512 registers x 8bits, enabling individual access, read and write operations to be performed. Details of input/output signal for IC2 are as shown in the following diagram.

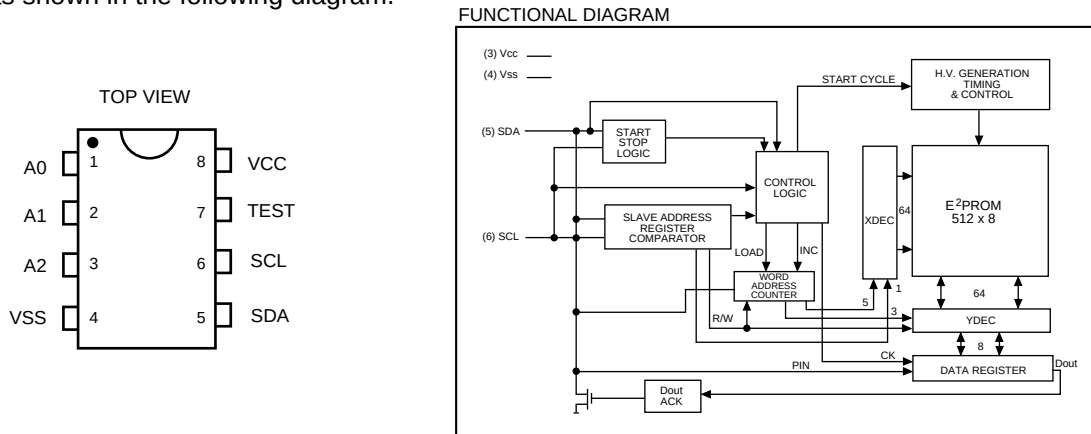


Figure T-2. Relation between Pin Nos, and Signals

Pin No.	Signal	I/O	Description
1-3	A0-A2	IN	Connected to GND.
4	VSS	IN	Connected to VC(-5V).
5	SDA	IN/OUT	Serial data input/output : input/outputs data to IC1.
6	SCL	IN	Clock signal input : input/outputs serial data at every one pulse.
7	TEST	IN	Connected to VC(-5V).
8	VCC	IN	Connected to GND.

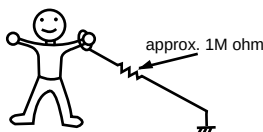
SERVICING

1. Precautions for Handling Electronic Components

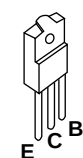
This unit uses CMOS LSI in the integral part of the circuits. When handling these parts, the following precautions should be strictly followed. CMOS LSI have extremely high impedance at its input and output terminals. For this reason, it is easily influenced by the surrounding high voltage power source, static electricity charge in clothes, etc., and sometimes it is not fully protected by the built-in protection circuit.

In order to protect CMOS LSI.

- 1) When storing and transporting, thoroughly wrap them in aluminium foil. Also wrap all PW boards containing them in aluminium foil.
- 2) When soldering, ground the technician as shown in the figure and use grounded soldering iron and work table.



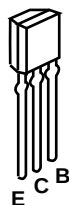
2. Shapes of Electronic Components



Transistor
2SB953



Transistor
2SB1238



Transistor
2SA933ASTP
DTA114YSA
DTB143ES
DTD143ES
KRA101M

3. Servicing of Touch Control Panel

We describe the procedures to permit servicing of the touch control panel of the microwave oven and the precautions you must take when doing so. To perform the servicing, power to the touch control panel is available either from the power line of the oven itself or from an external power source.

- (1) Servicing the touch control panel with power supply of the oven:

CAUTION: THE HIGH VOLTAGE TRANSFORMER OF THE MICROWAVE OVEN IS STILL LIVE DURING SERVICING PRESENTS A HAZARD.

Therefore, when checking the performance of the touch control panel, put the outer cabinet on the oven to avoid touching the high voltage transformer, or unplug the primary terminal (connector) of the high voltage transformer to turn it off; the end of such connector must be insulated with an insulating tape. After servicing, be sure to replace the leads to their original locations.

- A. On some models, the power supply cord between the touch control panel and the oven itself is so short that the two can't be separated. For those models, check and repair all the controls (sensor-related ones included) of the touch control panel while keeping it connected to the oven.
- B. On some models, the power supply cord between the touch control panel and the oven proper is long enough that they may be separated from each other. For those models, therefore, it is possible to check and repair the controls of the touch control panel while keeping it apart from the oven proper; in this case you must short

both ends of the door sensing switch (on PWB) of the touch control panel with a jumper, which brings about an operational state that is equivalent to the oven door being closed. As for the sensor-related controls of the touch control panel, checking them is possible if dummy resistor(s) with resistance equal to that of the controls are used.

- (2) Servicing the touch control panel with power supply from an external power source:

Disconnect the touch control panel completely from the oven proper, and short both ends of the door sensing switch (on PWB) of the touch control panel, which brings about an operational state that is equivalent to the oven door being closed. Connect an external power source to the power input terminal of the touch control panel, then it is possible to check and repair the controls of the touch control panel. It is also possible to check the sensor-related controls of the touch control panel by using the dummy resistor(s).

4. Servicing Tools

Tools required to service the touch control panel assembly.

- 1) Soldering iron: 30W
(It is recommended to use a soldering iron with a grounding terminal.)
- 2) Oscilloscope: Single beam, frequency range: DC-10MHz type or more advanced model.
- 3) Others: Hand tools

5. Other Precautions

- 1) Before turning on the power source of the control unit, remove the aluminium foil applied for preventing static electricity.
- 2) Connect the connector of the key unit to the control unit being sure that the lead wires are not twisted.
- 3) After aluminium foil is removed, be careful that abnormal voltage due to static electricity etc. is not applied to the input or output terminals.
- 4) Attach connectors, electrolytic capacitors, etc. to PWB, making sure that all connections are tight.
- 5) Be sure to use specified components where high precision is required.

PROCEDURE FOR CHECKING/CLEARING SERVICE COUNTS OF MICROWAVE OVEN FOR R-23AT

The following procedure enables the servicer to obtain the total service counts (cook cycles) for memory cooking, manual, repeat, double quantity cooking and defrost. The maximum capacity of the counter is 999,999 counts, above which the counter will reset to "0". The counter will retain the total counts (will not clear) in the event of a power disruption.

- 1) Practice for checking total service counts
(eg; 234,567 Counts).

--- flashing / ○ ---0.1sec. BUZZER

PAD	DISPLAY	INDICATOR	LED	PHONE
(door close)	•			
	•			
CHECK	NUMBER •	CHECK		○
CHECK	#1 82 68 (user total count)	CHECK		○
#2 VOLUME VOLUME DOUBLE QUANTITY	↓ 2 34 56 7 (service total count)			○
1	NUMBER 1 ↓ (after 1 sec.) 45 (filter used time)			○
2	NUMBER 2 ↓ (after 1 sec.) 2 00 (filter lim. time)			○
0 (No 10)	NUMBER 10 ↓ (after 1 sec.) 35 43 2 (service total cook time)			○
CHECK	•			○

#1: Denotes total service counts within the reach of user, of which checking and clearing practices are described in this instruction manual.

#2: Denotes the procedure for the servicer to disable checking/clearing. This procedure is instructed to service personnel only and is excluded from the operation manual.

- 2) Practice for clearing Service's counts

" : Flicker / ○ : 0.1 sec BUZZER

PAD ORDER	DISPLAY	PHONE
(Door close)	•	
CHECK	"NUMBER" • CHECK	○
CHECK	82 68 "CHECK" (User's Total Counts)	○
#1 VOLUME	82 68 "CHECK"	
VOLUME	82 68 "CHECK"	
DOUBLE QUANTITY	2 34 56 7 "CHECK" (Total Counts Service)	○
SET	0 "CHECK"	○
0	0 "CHECK"	○
SET	0 "CHECK"	○
CHECK	•	○

#1: Denotes the procedure for the servicer to disable clearing. This procedure is instructed to service personnel only and is excluded from the operation manual.

PROCEDURE FOR ENTERING TO IC-2 FOR R-23AT

When the control unit or IC-2 is exchanged, re-enter the constants of DEFROST, the memory information and the EEPROM data, referring to the following procedures. If not so, the oven will not operate correctly.

- 1) How to enter the contents of DEFROST

$$\begin{aligned} \text{Constants of DEFROST} \quad & \left\{ \begin{aligned} T &= \text{STG1} + \text{STG2} + \text{STG3} \\ \text{STG} &= A \times T + B \\ \text{STG1} &= 0.20 \times T + 20 \text{ Power level 50\%} \\ \text{STG2} &= 0.13 \times T + 30 \text{ Power level 30\%} \\ \text{STG3} &= 0.67 \times T - 50 \text{ Power level 20\%} \end{aligned} \right. \end{aligned}$$

Suppose above constants are entered.

" : Flicker / ○ : 0.1 sec BUZZER

PAD ORDER	DISPLAY	PHONE
(Door close)	•	
SET	•	
SET (within 2 sec.)	"NUMBER" •	○
#1 START	"NUMBER" •	
DEFROST	1 0.00 DEF	○
2,0	1 0.20 DEF (A)	○ x 2
MANUAL/ REPEAT	1 0 DEF	○
2	1 20 DEF #2 (+ - B)	○
POWER SETTING	1 DEF "POWER" 20 100%	○
5	1 DEF POWER 20 50%	○
MANUAL/ REPEAT	2 0.00 DEF	○
1,3	2 0.13 DEF (A)	○ x 2
MANUAL/ REPEAT	2 0 DEF	○
3	2 30 DEF (+ - B)	○
POWER SETTING	2 DEF "POWER" 30 100%	○
3	2 DEF POWER 30 30%	○
MANUAL/ REPEAT	3 0 DEF	
#3 5	3 5 DEF "CHECK"	○
POWER SETTING	3 DEF "POWER" 5 100%	○
2	3 DEF POWER 5 20%	○
SET	4 • DEF	○
SET	•	○

#1: No key entry signal.

#2: To set-B, touch the POWER SETTING key twice.

#3: Ex. "CHECK" will flash and the oven will beep after 50% of DEFROST time has lapsed when 5 key is entered.

2) How to enter the memory information

Example : Suppose cooking time 5 sec. and output power 100% are entered into the memory pad 1.

PAD ORDER	DISPLAY	PHONE
(Door close)	•	
SET	•	
SET (within 2 sec.)	"NUMBER" •	○
1	NUMBER 1 • 0	○
5	NUMBER 1 • 5	○
SET	"NUMBER" •	○
SET	•	○

Enter the memory information into the memory pads 1 ~ 10 referring to above example. The memory information are given below.

Memory No.	Cook Time	Output Power
1	5 sec.	100%
2	10 sec.	100%
3	20 sec.	100%
4	30 sec.	100%
5	40 sec.	100%
6	50 sec.	100%
7	1 min.	100%
8	1 min.15 sec.	100%
9	1 min.30 sec.	100%
10	2 mins.	100%
11-20	0 sec.	

3) How to enter the EEPROM data

Enter the EEPROM data into the memory pads, 3, 4, 6, 8, 9, 11, 12, 13, 14, 15 and 20, referring to following example and the table of EEPROM data.

Example : Suppose the EEPROM data "2235" is entered into the memory pad 3.

" " : Flicker / ○ : 0.1 sec BUZZER

PAD ORDER	DISPLAY	PHONE
(Door close)	•	
CHECK	"NUMBER" • CHECK	○
CHECK	#2 82 68 "CHECK" (User's Total Counts)	○
#1 VOLUME	#2 82 68 "CHECK"	
VOLUME	#2 82 68 "CHECK"	
DOUBLE QUANTITY	#3 XXXXXX "CHECK" (Total Counts of Service)	○
3	30 30 "CHECK"	○
SET	0 "CHECK"	○
2,2,3,5	22 35 "CHECK"	○ x 4
SET	22 35 "CHECK"	○
CHECK	•	○

#1: Denotes the procedure for the servicer to disable clearing. This procedure is instructed to service personnel only and is excluded from the operation manual.

#2: If IC-2 is exchanged, 0 should be indicated instead of 8268. But if the control unit is exchanged, 0 is not always indicated.

#3: Total counts of service, 6 figures will be displayed.

Table of EEPROM data

Memory Pad	Data	Contents
3	2 2 3 5	Higher temperature limit setting of magnetron thermistor detection
4	0 0 0 0	Constant setting of fan lock detection
6	0 1 0 0	Time setting of fan lock detection
8	3 2 0 0	Higher temperature limit setting of exhaust air detection
9	0 0 0 0	Constant setting of fan lock detection
11	0 0 0 0	Constant setting of magnetron thermistor detection
12	0 0 0 0	Constant setting of magnetron thermistor detection
13	0 0 0 0	Constant setting of magnetron thermistor detection
14	0 0 0 0	Constant setting of magnetron thermistor detection
15	1 5	Interval time setting of magnetron thermistor detection
20	0 0 0 0	Switch level setting of magnetron thermistor detection

OTHER CHECKING AND CLEARING PROCEDURE FOR R-23AT

1) To check the contents of defrost.

" " : Flicker / ○ : 0.1 sec BUZZER

PAD ORDER	DISPLAY	PHONE
(Door close)	•	
CHECK	"NUMBER" • CHECK	○
DEFROST	1 0.20 DEF CHECK (A)	○
	DEF CHECK 1 20 POWER (+ - B) 50%	
	2 0.13 DEF CHECK (A)	
	DEF CHECK 2 30 POWER (+ - B) 30%	
	DEF CHECK 3 5 POWER 20%	
	(Repeat)	
CHECK	•	○

#1: No key entry signal.

2) How to clear all counter(user and service) and total cooking time and used time of filter.

PAD ORDER	DISPLAY	PHONE
(Door close)	•	
SET	•	
SET	"NUMBER" •	○
DOUBLE	"NUMBER" • DOUBLE	○
CHECK	"NUMBER" • DOUBLE	
VOLUME	"NUMBER" • DOUBLE	
SET	•	○

COMPONENT REPLACEMENT AND ADJUSTMENT PROCEDURE

WARNING: Avoid possible exposure to microwave energy. Please follow the instructions below before operating the oven.

1. Disconnect the oven from power supply.
2. Make sure that a definite "click" can be heard when the microwave oven door is unlatched. (Hold the door in a closed position with one hand, then push the door open button with the other, this causes the latch leads to rise, it is then possible to hear a "click" as the door switches operate.)
3. Visually check the door and cavity face plate for damage (dents, cracks, signs of arcing etc.).

Carry out any remedial work that is necessary before operating the oven.

Do not operate the oven if any of the following conditions exist;

1. Door does not close firmly.
2. Door hinge, support or latch hook is damaged.
3. The door gasket or seal is damaged.
4. The door is bent or warped.
5. There are defective parts in the door interlock system.
6. There are defective parts in the microwave generating and transmission assembly.
7. There is visible damage to the oven.

Do not operate the oven:

1. Without the RF gasket (Magnetron).
2. If the wave guide or oven cavity are not intact.
3. If the door is not closed.
4. If the outer case (cabinet) is not fitted.

Please refer to 'OVEN PARTS, CABINET PARTS, CONTROL PANEL PARTS, DOOR PARTS', when carrying out any of the following removal procedures:

WARNING FOR WIRING

To prevent an electric shock, take the following precautions.

1. Before wiring,
 - 1) Disconnect the power supply cord.
 - 2) Open the door and block it open.
 - 3) Discharge the two high voltage capacitors and wait for 60 seconds.
2. Don't let the wire leads touch to the following parts:
 - 1) High voltage parts:
Magnetron, High voltage transformer, High voltage capacitor, High voltage rectifier assembly and High voltage wire.
 - 2) Hot parts:
Oven lamp, Magnetron, High voltage transformer,

and Oven cavity.

- 3) Sharp edge:
Bottom plate, Oven cavity, Waveguide flange, Chassis support and other metallic plate.
- 4) Movable parts (to prevent a fault)
Blower fan blade, Blower fan motor, Switches, Switch levers, Antenna motors and Sirrer antennas.
3. Do not catch the wire leads in the outer case cabinet.
4. Insert the positive lock connector until its pin is locked and make sure that the wire leads do not come off even if the wire leads are pulled.
5. To prevent an error function, connect the wire leads correctly, referring to the Pictorial Diagram.

OUTER CASE, REAR CABINET AND POWER SUPPLY CORD REMOVAL

To remove the components, procedure as follows.

1. Disconnect oven from power supply.
 2. Open the oven door and wedge it open.
 3. Remove the screws from the rear and along side the edge of the outer case.
 4. Slide the case back about 1 inch (3 cm) to free it from the oven cavity.
 5. Lift entire case from the unit.
 6. **DISCHARGE TWO HIGH VOLTAGE CAPACITORS BEFORE TOUCHING ANY OVEN COMPONENTS OR WIRING.**
 7. Now, outer case is free.
- N.B.; Step 1,2 and 9 form the basis of the 3D checks.

CAUTION:DISCHARGE TWO HIGH VOLTAGE CAPACITORS BEFORE TOUCHING ANY OVEN COMPONENTS OR WIRING.

To remove rear cabinet and power supply cord:

8. Remove the screws holding the rear cabinet to the oven cavity and blower motor.
9. Remove the one (1) screws holding the switch mounting angle to the rear cabinet and release the switch mounting angle from the rear cabinet.
10. Disconnect the power supply cord from the fuse holder.
11. Remove the one (1) screws holding the grounding wire of power supply cord to the oven cavity.
12. Remove the rear cabinet with the power supply cord from the oven cavity.
13. Loosen the tab of the cord bushing, and remove the power supply cord with the cord bushing from the rear cabinet.
14. Remove the cord bushing from the power supply cord,
15. Now, the power supply cord and rear cabinet are free.

HIGH VOLTAGE TRANSFORMER(S) REMOVAL

1. CARRY OUT 3D CHECKS.
2. Remove the rear cabinet, too.
3. Disconnect wire lead(s) of high voltage transformer(s) from magnetron(s).

4. Remove the wire lead(s) of high voltage transformer(s) from the wire holder.
5. Pull out the wire lead(s) of high voltage transformer(s) from the tube.
6. Disconnect wire lead(s) of high voltage transformer(s) from high voltage capacitor(s).
7. Disconnect the high voltage fuse(s) from high voltage transformer(s).

8. Disconnect the main wire harness from high voltage transformer(s).
9. Remove two (2) screws holding each power transformer to base plate.
10. Remove the high voltage transformer(s) from base plate.
12. Now, high voltage transformer(s) are free.

MAGNETRON(S) REMOVAL

Removal

1. CARRY OUT 3D CHECKS.
2. Remove the rear cabinet, too.
3. Remove the two (2) screws holding magnetron exhaust duct to upper and lower waveguide.
4. Remove the magnetron exhaust duct from oven cavity.
5. Disconnect wire leads from magnetron(s).
6. Disconnect magnetron thermistor from the connector of the stop switch harness.
7. Remove the one (1) screw holding the thermistor angle to the upper magnetron.
8. Remove the four (4) screws holding each magnetron to

upper and/or lower waveguide. When removing the screws, hold the magnetron to prevent it from falling.

9. Remove the magnetron(s) from upper and/or lower waveguide with care so magnetron antenna is not hit by any metal object around antenna.
10. Pull out the thermistor angle from the upper magnetron.
11. Now, the magnetron(s) is (are) free.

CAUTION: WHEN REPLACING MAGNETRON, BE SURE THE R.F. GASKET IS IN PLACE AND MOUNTING SCREWS ARE TIGHTENED SECURELY.

MAGNETRON THERMISTOR REPLACEMENT

Removal

1. CARRY OUT 3D CHECKS.
2. Remove the rear cabinet, too.
3. Remove the upper magnetron from the upper waveguide flange, referring to "MAGNETRON(S) REMOVAL".
4. Now, the upper magnetron with the magnetron thermistor should be free.
5. Remove the thermistor angle from the upper magnetron by pulling out.
6. Straighten the tab of the magnetron thermistor angle holding the magnetron thermistor.
7. Remove the magnetron thermistor from the thermistor angle.
8. Now, the magnetron thermistor is free.

Re-install

1. Install the magnetron thermistor to the thermistor angle as shown in Figure C-1.

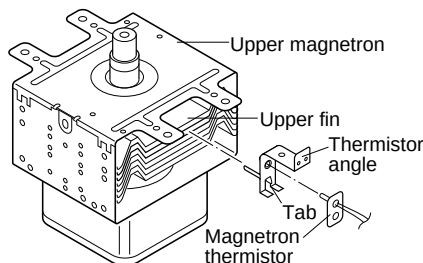


Figure C-1. Magnetron thermistor installation

2. Hold the magnetron thermistor to the thermistor angle by bending the tab of the thermistor angle.
3. Insert the thermistor angle between the 2nd. fin and 3rd. fin from the upper fin of the upper magnetron and push it until the thermistor angle stops.

NOTE: The magnetron thermistor should be between the upper fin and the 2nd. fin.

4. Re-install the upper magnetron to the upper waveguide flange with four (4) screws.
5. Re-install the thermistor angle to the upper waveguide flange with one (1) screw.
6. Re-install the magnetron exhaust duct to the upper and lower waveguide flanges with two (2) screws.
7. Route the thermistor harness under the magnetron temperature fuse.
8. Connect the thermistor harness to the stop switch harness.
9. Connect the wire leads to the upper magnetron, referring to the pictorial diagram.
10. Re-install the power supply cord, rear cabinet and outer case cabinet to the oven by reversing the procedures of "OUTER CASE, REAR CABINET AND POWER SUPPLY CORD REMOVAL".

HIGH VOLTAGE CAPACITOR, HIGH VOLTAGE FUSE AND HIGH VOLTAGE RECTIFIER ASSEMBLY REMOVAL

1. CARRY OUT 3D CHECKS.
2. Remove the rear cabinet, too.
3. Remove two (2) screws holding earth side terminals of high voltage rectifier assembly to the capacitor holder and oven cavity.
4. Disconnect all wire leads from the high voltage capacitor.

5. Disconnect high voltage fuse(s) from the high voltage transformer(s). Now, high voltage fuse(s) is(are) free.
6. Remove the three (3) screws holding the blower motor to the top of oven cavity, the chassis support and air duct.
7. Disconnect high voltage wire lead(s) of the high voltage rectifier assembly from the magnetron(s).

Now, the the high voltage rectifier assembly is free.

8. Remove two (2) screws holding the capacitor holder to oven cavity.

Now, the capacitors are free.

CAUTION:

1. DISCHARGE THE TWO HIGH VOLTAGE CAPACITORS BEFORE TOUCHING ANY OVEN COMPONENTS OR WIRING.

2. DO NOT REPLACE ONLY THE HIGH VOLTAGE RECTIFIER. IF IT IS DEFECTIVE, REPLACE THE HIGH VOLTAGE RECTIFIER ASSEMBLY.
3. WHEN REPLACING THE HIGH VOLTAGE RECTIFIER ASSEMBLY AND THE HIGH VOLTAGE CAPACITOR, THE CATHODE (EARTH) SIDE TERMINAL OF THE HIGH VOLTAGE RECTIFIER MUST BE SECURED FIRMLY WITH A EARTHING SCREW.

BLOWER MOTOR AND BLOWER MOTOR TEMPERATURE FUSE REMOVAL

1. CARRY OUT 3D CHECKS.
2. Remove the rear cabinet, too.
3. Disconnect the wire leads from the blower motor and blower motor temperature fuse.
4. Remove the one (1) screw holding the blower motor to the oven cavity.
5. Remove the one (1) screw holding the blower motor to the chassis support.

6. Remove the one (1) screw holding the air duct to the blower motor.
7. Remove the blower motor from the oven cavity.
8. Remove the two (2) screws holding the blower motor temperature fuse to the blower motor.
9. Now, the blower motor and blower motor temperature fuse are free.

STIRRER MOTORS (UPPER AND LOWER) REMOVAL

UPPER

1. CARRY OUT 3D CHECKS.
2. Disconnect the wire leads from the stirrer motor (upper).
3. Remove the one (1) screw holding the stirrer motor (upper) to the oven cavity.
4. Turn and lift up the stirrer motor (upper).
5. Now, the stirrer motor (upper) is free.

LOWER

1. Disconnect oven from the power supply.
2. Remove the stirrer motor cover by snipping off the

material in four portions.

3. Where the portions have been snipped off bend the portions flat. No sharp edge must be evident after removal of the stirrer motor cover.
4. Disconnect the wire leads from the stirrer motor (lower).
5. Remove the one (1) screw holding the stirrer motor (Lower) to the oven cavity.
6. Now, the stirrer motor (lower) is free.
7. After replacement use one (1) screw to fit the stirrer motor cover. (This screw has been fitted to the base plate near the stirrer motor cover beforehand.)

HOW TO RELEASE THE POSITIVE LOCK® CONNECTOR.

Procedure

1. CARRY OUT 3D CHECKS.
2. Pushing the lever of positive lock® connector, pull down the connector from the terminal.
3. Now, the connector is free.

CAUTION: WHEN CONNECTING THE POSITIVE LOCK® CONNECTORS TO THE TERMINALS, CONNECT THE POSITIVE LOCK® CONNECTOR SO THAT THE LEVER FACES YOU.

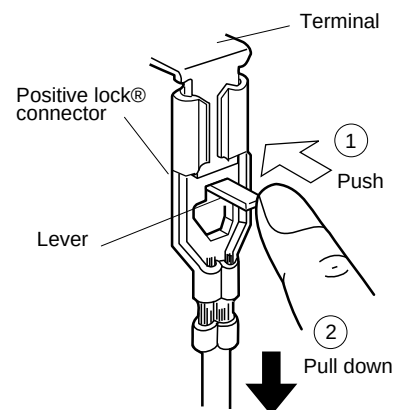


Figure C-2. How to release the positive lock connector.

OVEN LAMP AND LAMP SOCKET REMOVAL

1. CARRY OUT 3D CHECKS.
2. Remove the oven lamp.
3. Pull the wire leads from the oven lamp socket by pushing the terminal hole of the oven lamp socket with the small flat type screw driver.
4. Lift up the oven lamp socket .
5. Now, the oven lamp socket is free.

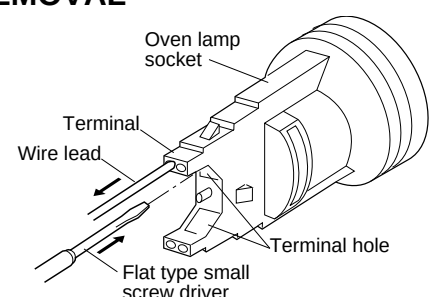
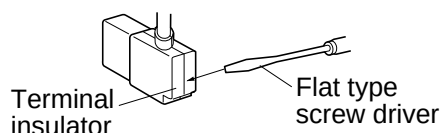


Figure C-3. Oven lamp socket

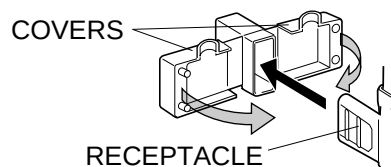
TERMINAL INSULATOR REPLACEMENT

1. Open covers of the terminal insulator by using small flat type screw driver.
2. Remove the receptacle from the terminal insulator.
3. Now, the terminal insulator is free.



Installation

1. Insert the receptacle into terminal insulator.
2. Close covers of the terminal insulator, as shown illustrated below.



CONTROL PANEL ASSEMBLY AND CONTROL UNIT REMOVAL

CONTROL PANEL ASSEMBLY REMOVAL

The complete control panel should be removed for replacement of components. To remove the control panel, proceed as follows:

1. CARRY OUT 3D CHECKS.
2. Remove the air intake filter assembly from the base plate.
3. Remove two (2) screws holding the control panel to the base plate.
4. Pull down the control panel and remove it forward.
5. Disconnect two connectors (A), (B), (H) and TAB terminal (TAB1,2,3,4) from the control unit.
6. Now the control panel assembly is free.

CAUTION FOR TOUCH CONTROL PANEL REMOVAL

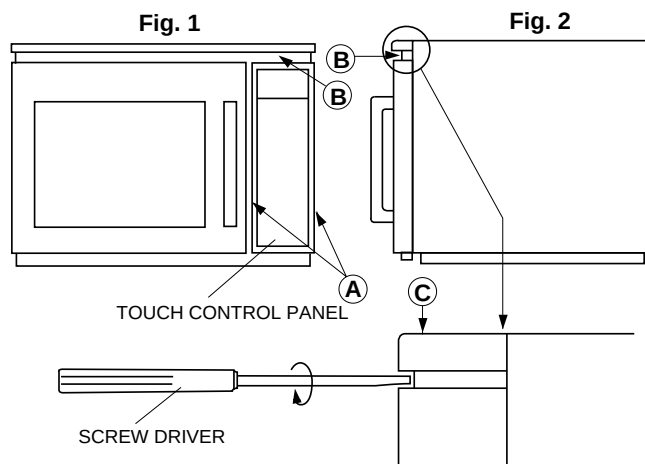
- 1) Hold the lower end (Position A, Fig. 1) of the touch control panel assembly firmly while sliding it down and toward you.

DO NOT FORCE THE CONTROL UNIT TO SLIDE DOWN DURING REMOVAL. THIS MAY CAUSE DAMAGE TO THE CONTROL UNIT BY HITTING A RELAY (RY-4 for R-23AT ; RY-3 for R-22AM/23AM) OR THE TAB TERMINALS LOCATED AT THE FRONT OF THE OVEN CAVITY.

- 2) If the Touch Control Panel is hard to remove;
(1) Insert a flat head screw driver into space B . (Fig. 1)
(2) Rotate the screwdriver clockwise while holding position C of the Touch Control Panel. (Fig. 2)

TO AVOID DAMAGE TO TOUCH CONTROL PANEL, COVER THE TIP OF SCREWDRIVER WITH TAPE.

- (3) If the relay (RY-4 for R-23AT ; RY-3 for R-22AM/23AM) is hit, re-solder the Relay (RY-4) prior to reinstalling the Touch Control Panel.



Replacement of individual component is as follows:

for R-22AM/23AM

CONTROL UNIT AND CONTROL PANEL FRAME (WITH SWITCH UNIT)

7. Remove two (2) screws holding the control panel mounting angle to the panel frame.
8. Lift up the control panel mounting angle from the panel frame.
9. Disconnect the connectors (J) and (E) from the control unit.
10. Remove six (6) screws holding the control unit to the panel frame assembly.
11. Push down the right side two (2) hooks fixing the control unit to the panel frame assembly, and lift up the control unit upward.
12. Now, the control unit and control panel frame (with switch unit) are free.

CAUTION:

At installing control panel unit assembly to main body set:

1. Ensure the installation of wiring-related parts without negligence.
2. When inserting wire cable to main body set, ensure them free from caught-in trouble. In addition, when installing the control panel assembly to base plate with screws, be sure of pushing the control panel unit upward to fix with screws firmly.
3. Do not allow any wire leads to come near the varistor works, because it will explode and the wire leads near by the varistor will be damaged.

SWITCH UNIT

13. Remove the three (3) screws holding the switch unit (Main) to the control panel frame.
14. Remove the two (2) screws holding the switch unit (Sub.) to the control panel frame.
15. Now, the switch unit is free

ROTARY ENCODER

13. Remove the one (1) screw holding the earth wire to the rotary encoder.
14. Remove the two (2) screws and one (1) washer holding the rotary encoder to the control panel frame.
15. Remove the knob from the rotary encoder shaft.
16. Now, the rotary encoder is free.

for R-23AT

CONTROL UNIT AND CONTROL PANEL FRAME (WITH KEY)

7. Remove three (3) screws holding the control panel mounting angle to the panel frame.
8. Lift up the control panel mounting angle from the panel frame.
9. Disconnect connector (G) from the control unit by pushing the hooks of cable holder inwardly.
10. Remove six (6) screws holding the control unit to the panel frame assembly.
11. Push down the right side two (2) hooks fixing the control unit to the panel frame assembly, and lift up the control unit upward.
12. Now, the control unit and control panel frame (with key) are free.

CAUTION:

At installing control panel unit assembly to main body set:

1. **Ensure the installation of wiring-related parts without negligence.**

2. When inserting key cable to main body set, ensure them free from caught-in trouble. In addition, when installing the control panel assembly to base plate with screws, be sure of pushing the control panel unit upward to fix with screws firmly.

3. **Do not allow any wire leads to come near the varistor works, because it will explode and the wire leads near by the varistor will be damaged.**

NOTE: 1. Before attaching a new key unit, remove remaining adhesive on the control panel frame surfaces completely with a soft cloth soaked in alcohol.

2. When attaching the key unit to the control panel frame, adjust the upper edge and right edge of the key unit to the correct position of control panel frame.

3. Stick the key unit firmly to the control panel frame by rubbing with soft cloth to prevent scratching.

POWER SUPPLY CORD REPLACEMENT

1. CARRY OUT 3D CHECKS
2. Release the cord bushing from the rear cabinet.
3. Disconnect the brown and blue wires of the power supply cord from the noise filter.
4. Remove the single (1) screw holding the earth wire of power supply cord.
5. Remove the power supply cord.

Re-install

1. Insert the power supply cord into the cord bushing.
2. Connect the brown and blue wires of power supply cord into the terminals of noise filter, referring to pictorial diagram.
3. Install the green/yellow wire of power supply cord with the one (1) screw.
4. Re-install the cord bushing to the rear cabinet.

5. CARRY OUT 4R CHECKS.

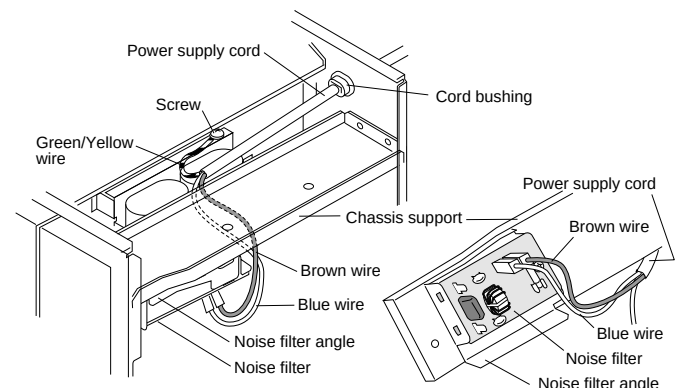


Figure C-4. Power supply cord replacement

1ST LATCH, 2ND LATCH, 3RD LATCH, MONITOR, AND STOP SWITCHES REMOVAL

1. CARRY OUT 3D CHECKS.
2. Remove the control panel from the oven cavity referring to "CONTROL PANEL REMOVAL".
3. Remove the two (2) screws holding the latch hook to the oven cavity.
4. Open the door and pull the latch hook out of the oven cavity.
5. For 3rd. latch, stop or Monitor switch removal
 - 5-1. Disconnect the wire leads from the switch.
 - 5-2. Push the retaining tabs outward slightly and then pull the switch forwards and remove it from the latch hook.

6. For 1st. latch and 2nd. latch switches removal
 - 6-1. Disconnect the wire leads from the 1st latch and 2nd. latch switches.
 - 6-2. Remove the single (1) screw and nut holding the 1st latch and 2nd. latch switches to the latch hook.

CAUTION: IF THE LATCH HOOK IS NEW, WHEN THE 1ST LATCH SWITCH AND 2ND. LATCH SWITCH ARE INSTALLED, THE TWO (2) TABS OF THE LATCH HOOK SHOULD BE BROKEN.

1ST, 2ND, 3RD LATCH SWITCH, STOP SWITCH AND MONITOR SWITCH ADJUSTMENT

In case 1st latch switch, 2nd latch, stop switch, 3rd latch switch and monitor switch do not operate properly due to

a mis-adjustment, the following adjustment should be made.

1. Loosen the two (2) screws holding the latch hook.
2. With the door closed, adjust the latch hook by moving it back and forward, or up and down. In and out play of the door allowed by the latch hook should be less than 0.5mm. The vertical position of the latch hook should be placed where the stop switch and 1st, 2nd, 3rd latch switches have activated with the door closed. The horizontal position of the latch hook should be placed where the monitor switch has activated with the door closed.
3. Secure the screws with washers firmly.
4. Make sure of the 1st, 2nd, 3rd latch switches, stop switch, and monitor switch operation. If those switches have not activated with the door closed, loose two (2) screws holding latch hook and adjust the latch hook position.

After adjustment, make sure of the following:

1. In and out play of door remains less than 0.5mm when in the latched position.
2. The stop switch and 1st, 2nd, 3rd latch switches interrupt the circuit before the door open when the door release lever is pulled, and then and monitor switch close the circuit when the door is opened.

3. Re-install outer case and check for microwave leakage around the door with an approved microwave survey meter. (Refer to Microwave Measurement Procedure.)

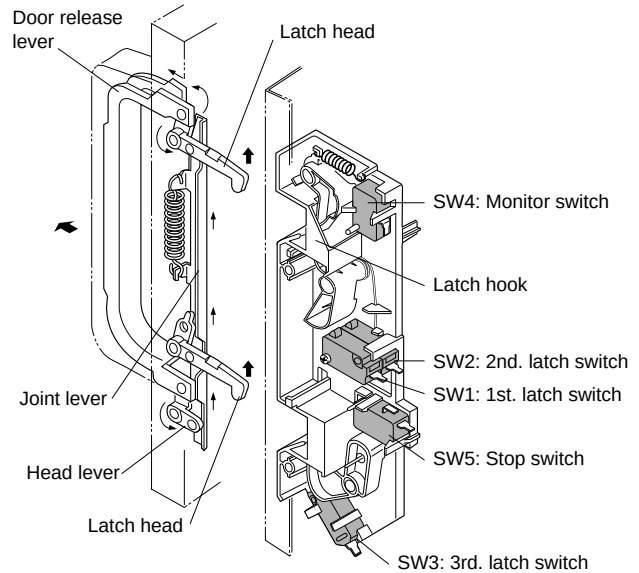


Figure C-5 Latch Switch Adjustments

DOOR REPLACEMENT AND ADJUSTMENT

REMOVAL

1. CARRY OUT 3D CHECKS.
2. Remove the two (2) screws holding each of the upper and lower oven hinges to the oven cavity.
3. Remove door assembly with upper and lower oven hinges by pulling it forward.
4. Release upper and lower oven hinges from door assembly.
5. Now, door assembly is free.

NOTE: When individual parts are replaced, refer to "Door Disassembly".

RE-INSTALL

1. Insert the upper and lower oven hinges into door hinge pins.
2. Insert the upper and lower oven hinges with door assembly into rectangular holes of oven cavity front plate.
3. Make sure that the door is parallel with oven face lines (left and upper side line) and door latch heads pass through the latch holes correctly.
4. Fasten upper and lower oven hinges firmly to oven cavity with two (2) screws on each hinge.

Note: After any service to the door;

(A) Make sure that 1st. latch switch, 2nd. latch switch, 3rd. latch switch, stop switch and monitor switch are operating properly. (Refer to chapter "Test Procedures").

(B) An approved microwave survey meter should be used to assure compliance with proper microwave radiation emission limitation standards.

DOOR ADJUSTMENT

When removing and/or loosening hinges such as in door replacement, the following adjustment criteria are taken. Door adjustment is performed with the door properly installed and closed and while the oven hinges are loose.

1. Loosen upper and lower oven hinges with phillips head screw driver.
2. Adjust the door by moving it vertically so that the top right hand corner of the door is in line with the top of the control panel frame assembly.
3. Tighten the upper and lower oven hinge screws.

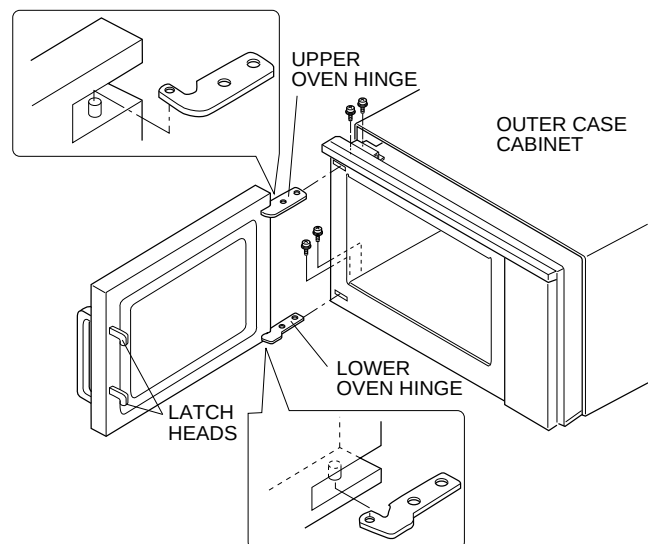


Figure C-6. Door Replacement

After adjustment, make sure of the following:

1. Door latch heads smoothly catch the latch hook through the latch holes, and the latch head goes through the center of the latch hole.
2. Deviation of the door alignment from horizontal line of cavity face plate is to be less than 1.0mm.
3. The door is positioned with its face depressed toward the cavity face plate.
4. Re-install outer case and check for microwave leakage

around door with an approved microwave survey meter. (Refer to Microwave Measurement Procedure.)

Note: The door on a microwave oven is designed to act as an electronic seal preventing the leakage of microwave energy from oven cavity during cook cycle. This function does not require that door be air-tight, moisture (condensation)-tight or light-tight. Therefore, occasional appearance of mois-

ture, light or sensing of gentle warm air movement around oven door is not abnormal and do not of themselves, indicate a leakage of microwave energy from oven cavity. If such were the case, your oven could not be equipped with a vent, the very purpose of which is to exhaust the vapor-laden air from the oven cavity.

DOOR DISASSEMBLY

CHOKE COVER REMOVAL

1. Open the door and insert a putty knife (thickness of about 0.5mm) in gap between the choke cover and corner portion of door panel to free engaging parts. Refer to Fig. C-7.

NOTE: As the choke cover and door panel are engage at 16 places, do not force any perticular part.

2. Remove the choke cover carefully. (If choke cover is broken, replace with a new one.)

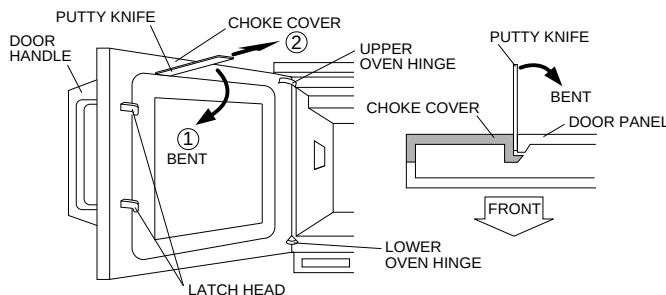


Figure C-7. Choke cover

DOOR COMPONENTS REMOVAL

UPPER AND LOWER OVEN HINGES REMOVAL

1. Remove the door assembly from oven cavity, referring to "REMOVAL" of "DOOR REPLACEMENT AND ADJUSTMENT".
2. Remove choke cover, referring to "CHOKE COVER REMOVAL".
3. Release the oven hinges from the door panel.
4. Now, the oven hinges are free.

DOOR HANDLE REMOVAL

1. Remove the door assembly from oven cavity, "REMOVAL" of "DOOR REPLACEMENT AND ADJUST-

MENT".

2. Place door assembly on a soft cloth with latches facing up.
3. Remove choke cover from door panel, referring to "CHOKE COVER REMOVAL".
4. Remove two (2) screws holding the door handle to door.
5. Remove the door handle from door panel.
6. Now, door handle is free.

UPPER AND LOWER LATCH HEADS REMOVAL

7. Remove the door release lever from the door assembly.
8. Remove the three (3) screws holding the joint plate to the door panel.
9. Release the latch spring from the tab of the joint lever and joint plate.
10. Release the latch heads from joint lever and joint plate.
11. Now, the latch heads are free.

DOOR CASE REMOVAL

1. Remove the door assembly from oven cavity, referring to "REMOVAL" of "DOOR REPLACEMENT AND ADJUSTMENT".
2. Remove choke cover from door panel, referring to "CHOKE COVER REMOVAL".
3. Remove door handle from door panel, referring to "DOOR HANDLE REMOVAL".
4. Bend up four (4) nails of door case.
5. Remove door case from door panel.
6. Now, the door case is free.

DOOR GLASS REMOVAL

7. Remove the four (4) screws holding two (2) outside window fixing plates to door panel.
8. Now, the door glass is free.

SERVICE INFORMATION

IMPORTANT: When the magnetron MG1 and/or MG2 is replacing, the relays (RY3 and RY4 for R-23AT; RY2 and RY3 for R-22AM/23AM) on control unit must be replaced at the same time. Because if the magnetron's life has been over, the relay's life may also be over.

MICROWAVE MEASUREMENT

After adjustment of door latch switches, monitor switch and door are completed individually or collectively, the following leakage test must be performed with a survey instrument and it must be confirmed that the result meets the requirements of the performance standard for microwave oven.

REQUIREMENT

The safety switch must prevent microwave radiation emission in excess of $5\text{mW}/\text{cm}^2$ at any point 5cm or more from external surface of the oven.

PREPARATION FOR TESTING:

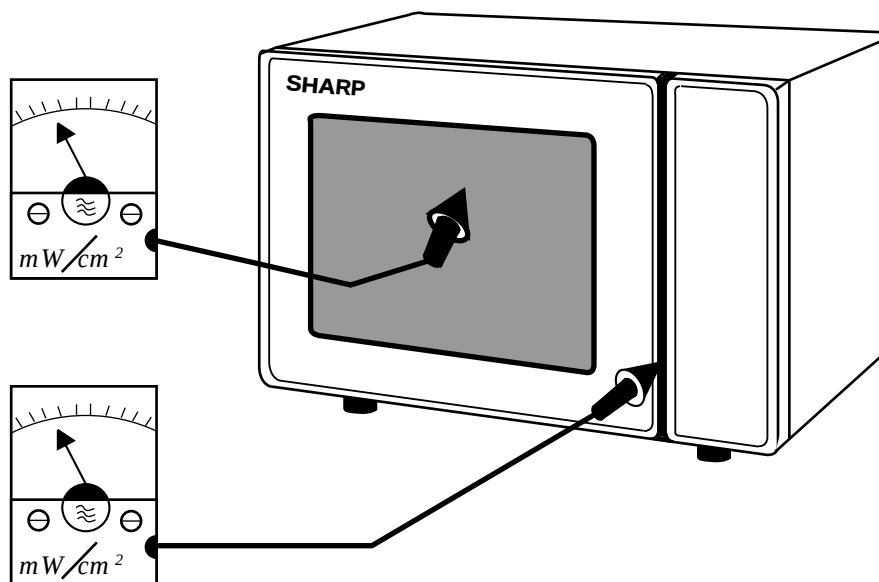
Before beginning the actual test for leakage, proceed as follows;

1. Make sure that the test instrument is operating normally as specified in its instruction booklet.
Important:
Survey instruments that comply with the requirement for instrumentations as prescribed by the performance standard for microwave ovens must be used for testing.

Recommended instruments are:

NARDA 8100
NARDA 8200
HOLADAY HI 1500
SIMPSON 380M

2. Place the oven tray into the oven cavity.
3. Place the load of $275 \pm 15\text{ml}$ of water initially at $20 \pm 5^\circ\text{C}$ in the centre of the oven tray. The water container should be a low form of 600 ml beaker with inside diameter of approx. 8.5cm and made of an electrically non-conductive material such as glass or plastic.
The placing of this standard load in the oven is important not only to protect the oven, but also to insure that any leakage is measured accurately.
4. Close the door and turn the oven ON with the timer set for several minutes. If the water begins to boil before the survey is completed, replace it with 275ml of cool water.
5. Move the probe slowly (not faster than 2.5cm/sec.) along the gap.
6. The microwave radiation emission should be measured at any point of 5cm or more from the external surface of the oven.



Microwave leakage measurement at 5 cm distance

TEST DATA AT A GLANCE

Parts	Symbol	Value / Data
Weak point	F1	A017
Fuse	F2	F6.3A 250V
Fuse	F3	M8A
Fuse	F4	M8A
Temperature fuse (Mag)	TF1	150°C
Temperature fuse (Mag.)	TF2	150°C
Temperature fuse(Blower motor)	TF3	120°C
Temperature fuse (Oven)	TF4	120°C
Magnetron thermistor		Approx. 373kΩ at 15°C, 292KΩ at 20°C, 231KΩ at 25°C
Oven thermistor (1)		Approx. 373kΩ at 15°C, 292KΩ at 20°C, 231KΩ at 25°C
Oven thermistor (2)		Approx. 16kΩ at 15°C, 13KΩ at 20°C, 11KΩ at 25°C
Monitor resistor	R1	4.3Ω 20W
Oven lamp	OL	250V 25W
High voltage capacitor	C1	0.94μF AC 2300V
High voltage capacitor	C2	0.94μF AC 2300V
High voltage transformer (for R-22AM)	T1, T2	Filament winding < 1Ω Secondary winding Approx. 75Ω Primary winding Approx. 1.8Ω
High voltage transformer (for R-23AM/ 23AT)	T1, T2	Filament winding < 1Ω Secondary winding Approx. 75Ω Primary winding Approx. 1.2Ω
Magnetron	MG1	Filament winding < 1Ω Filament winding - chassis ∞ Ω
Magnetron	MG2	Filament winding < 1Ω Filament winding - chassis ∞ Ω

WARNING: DISCONNECT THE PLUG WHEN MEASURING RESISTANCE.

SCHEMATIC
NOTE: CONDITION OF OVEN
1. POWER SUPPLY CONNECTED AND/OR 1MINUTE
AFTER DOOR CLOSED OR COOK OFF.
2. APPEAR ON DISPLAY.

NOTE: ★ Indicates components with potential above 250 V.

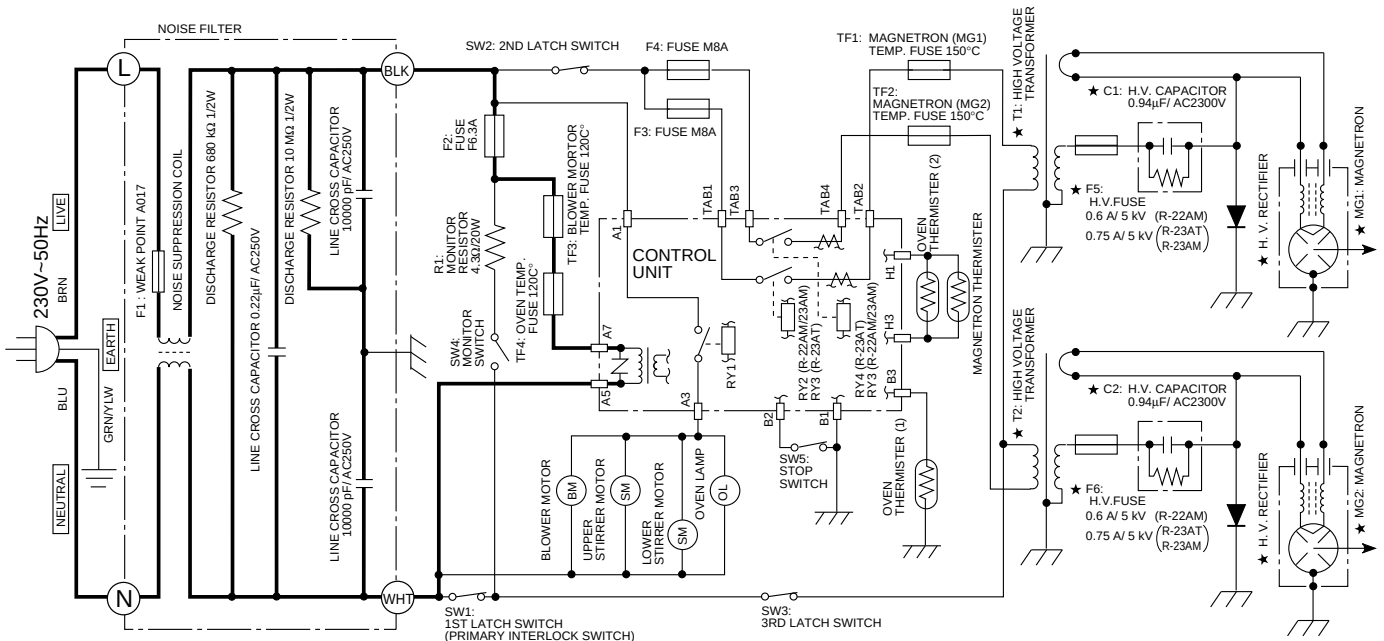
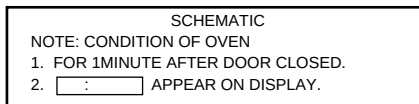


Figure O-1 Oven Schematic-OFF Condition



NOTE: ★ Indicates components with potential above 250 V.

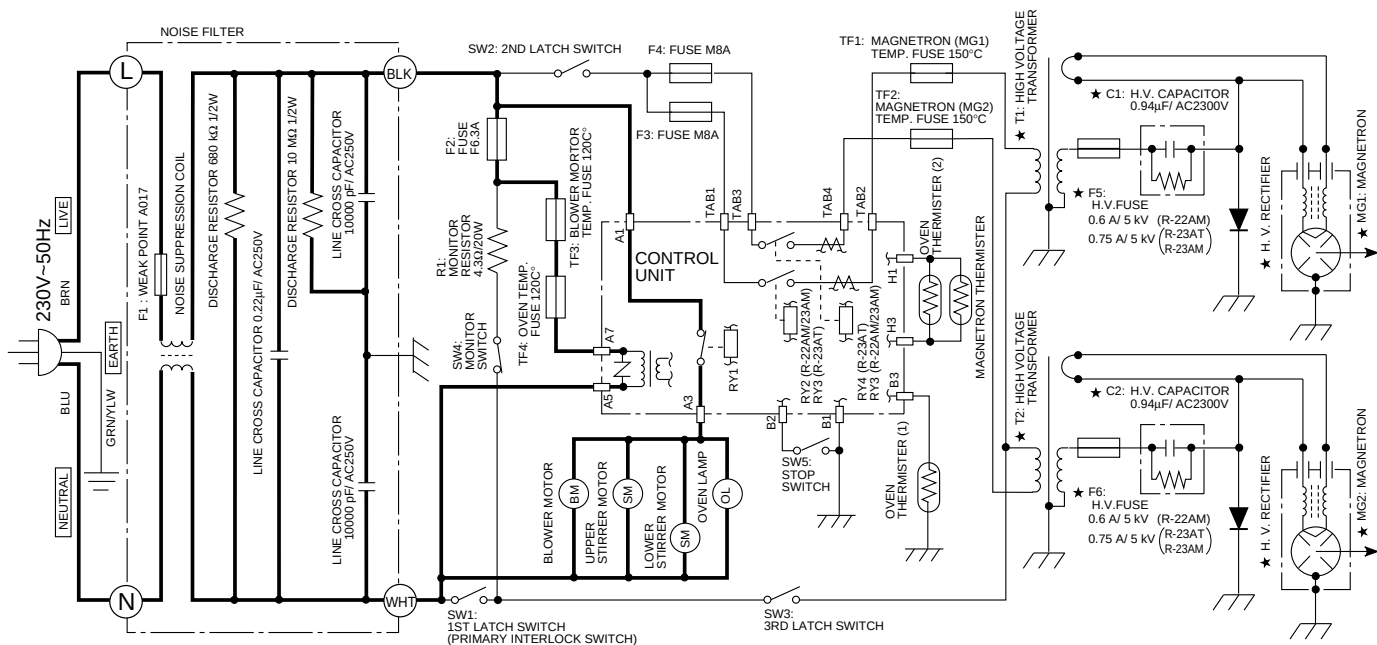


Figure O-2 Oven Schematic-IDLE Condition (Door opened condition)

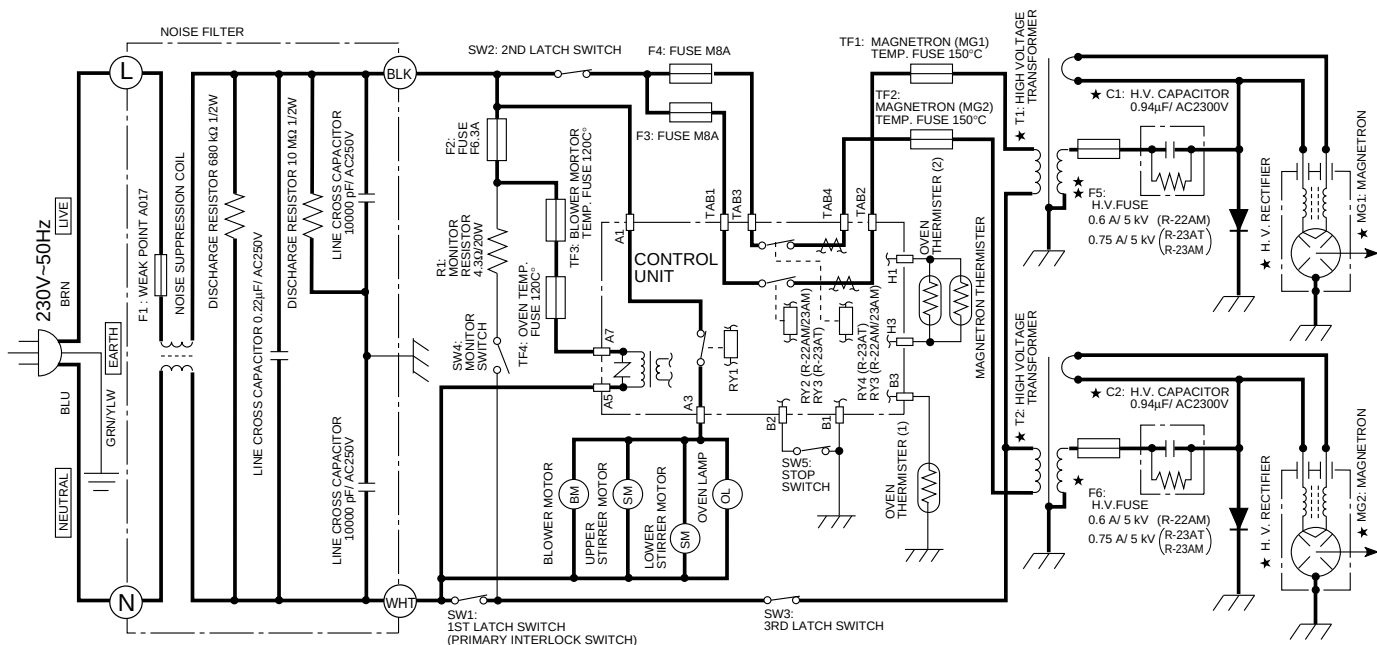
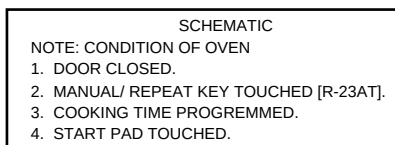
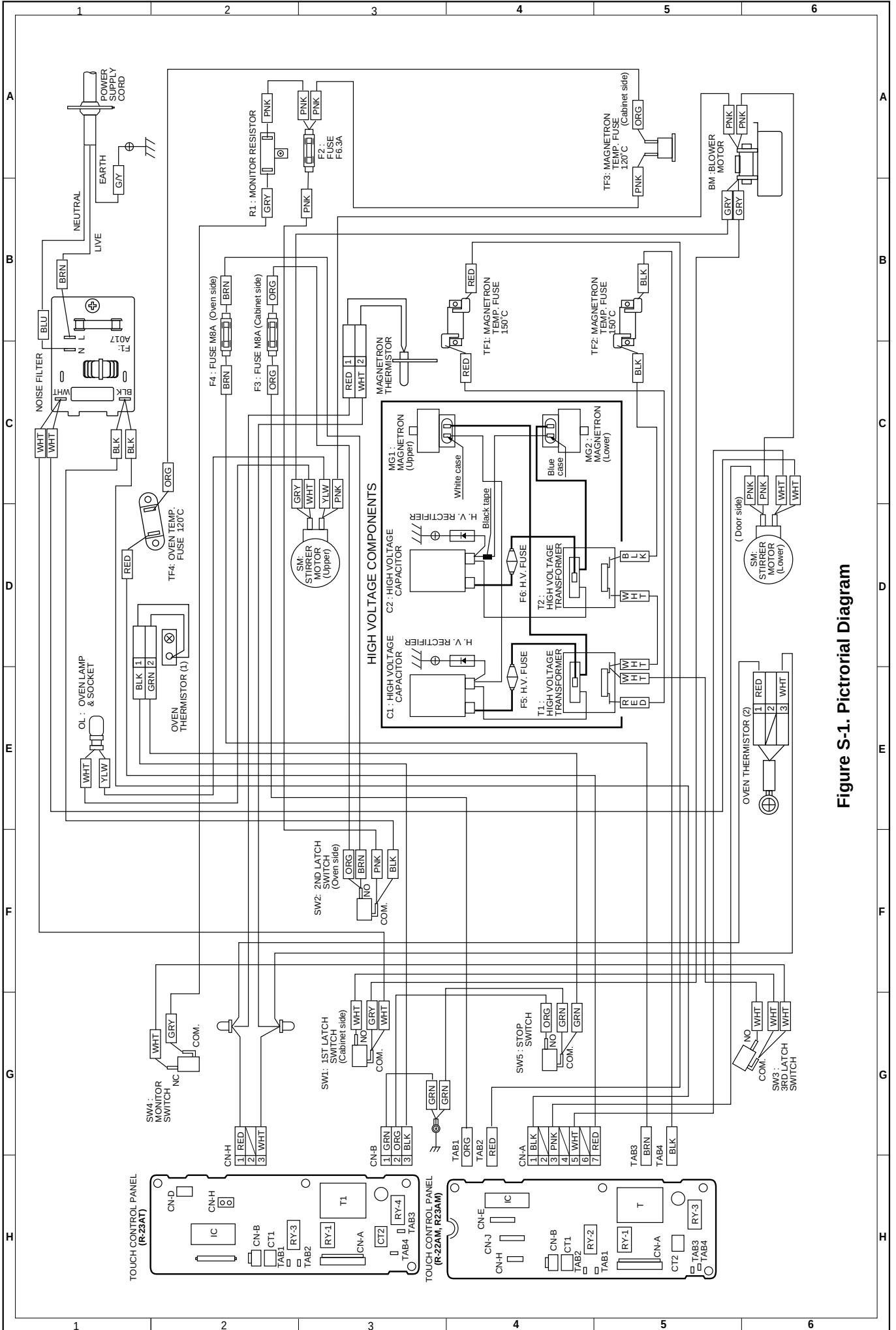


Figure O-3 Oven Schematic-Cooking Condition



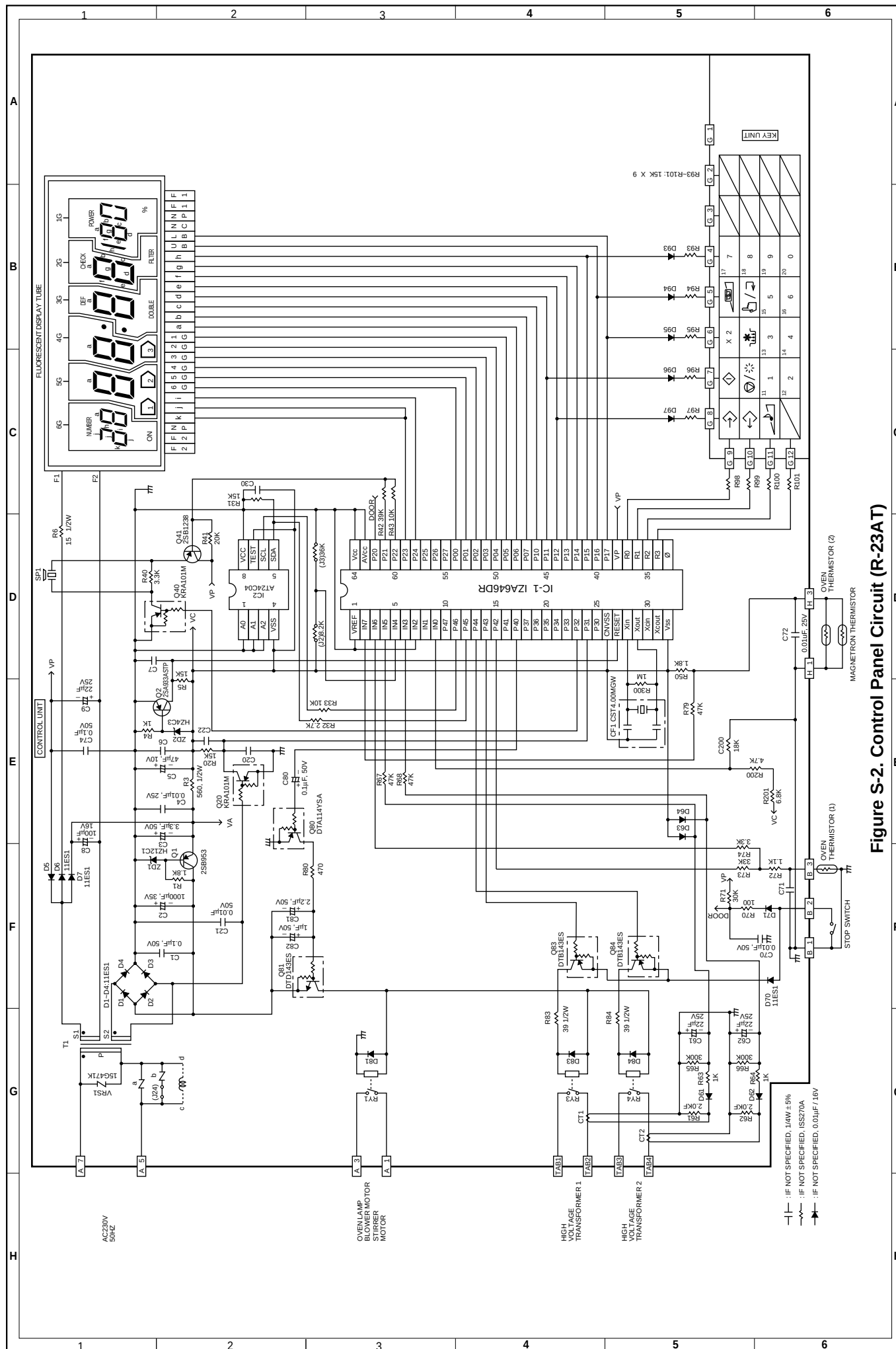


Figure S-2. Control Panel Circuit (R-23AT)



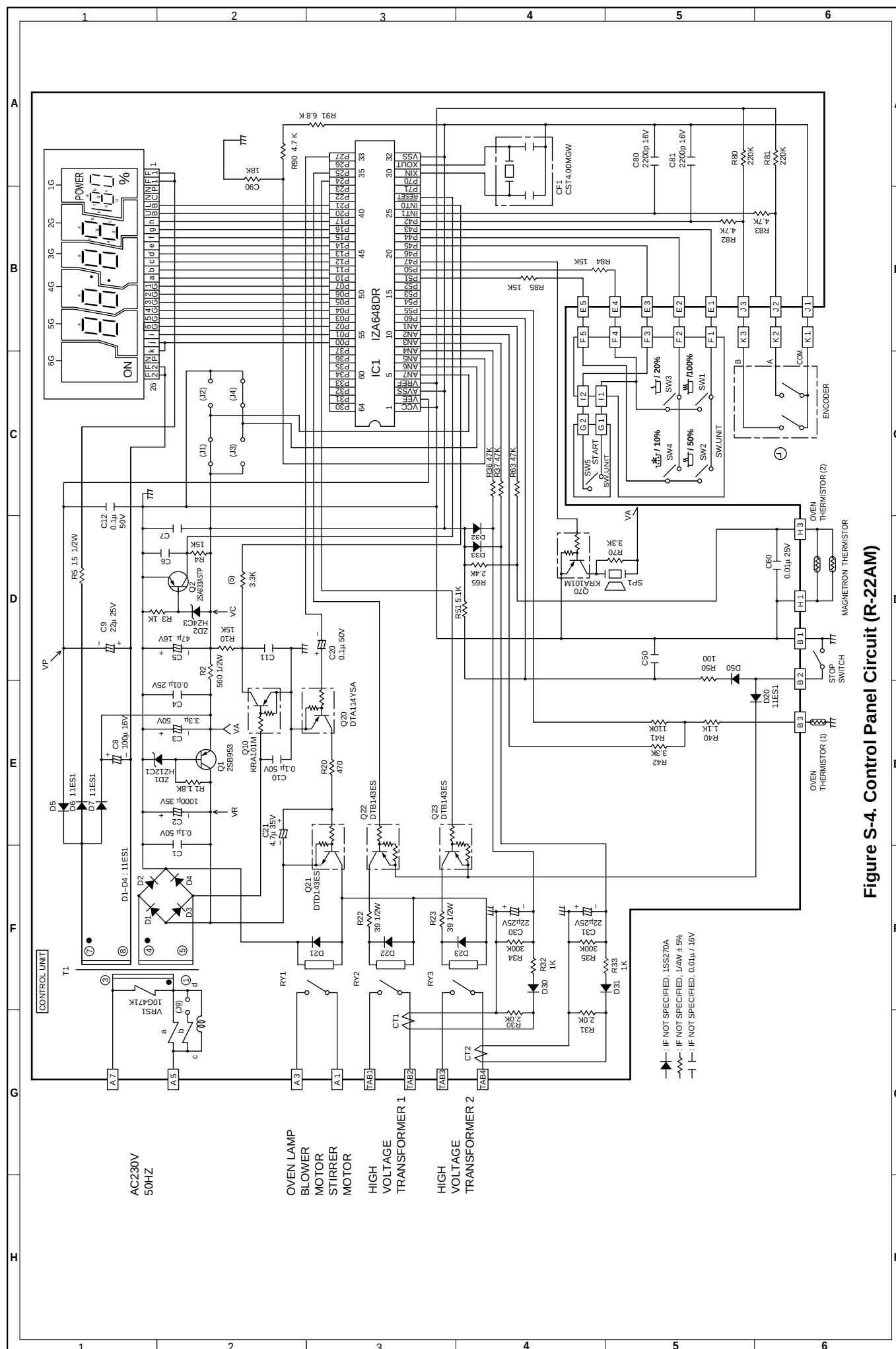
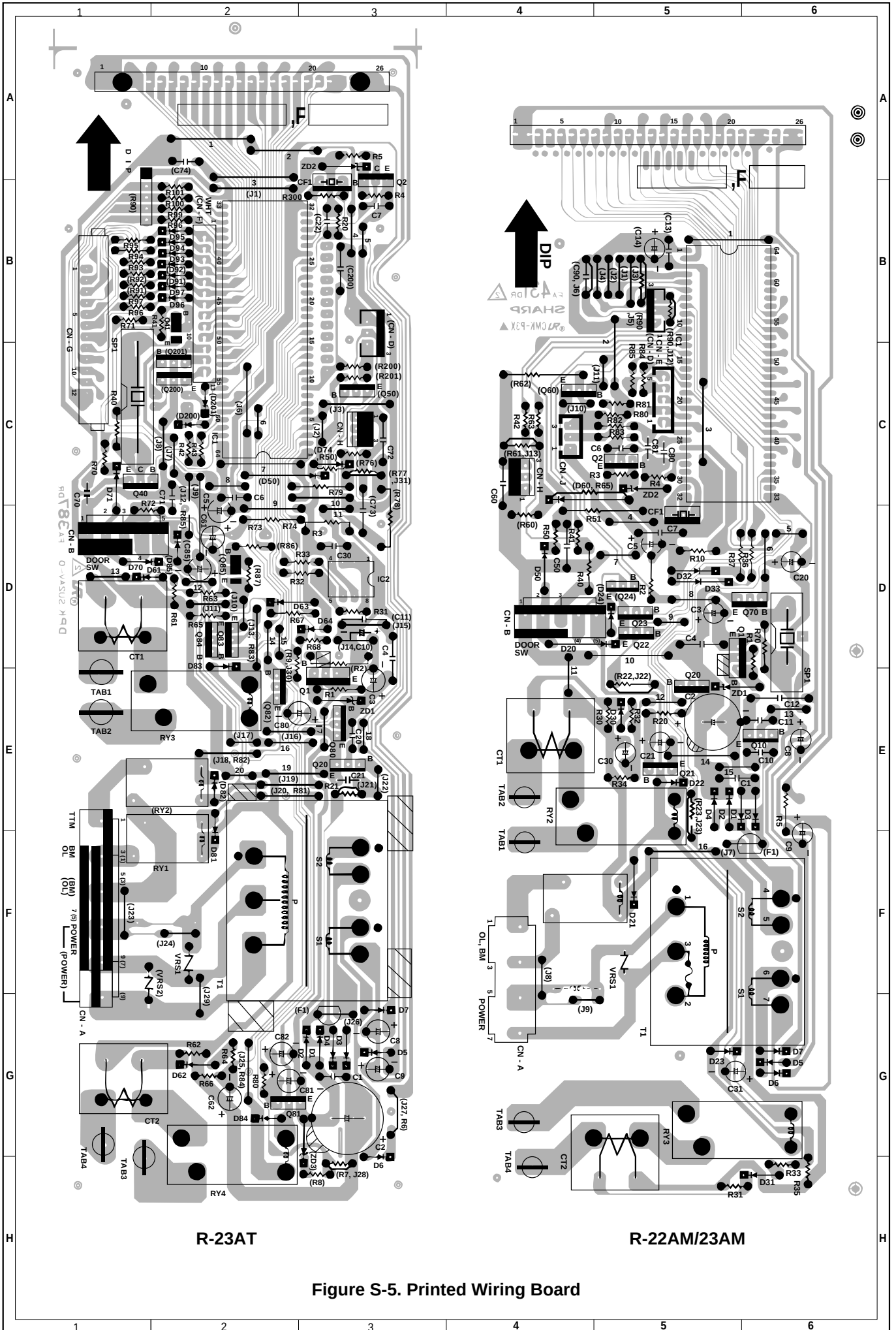


Figure S-4. Control Panel Circuit (R-22AM)



PARTS LIST

Note: The parts marked "Δ" may cause undue microwave exposure.

The parts marked "*" are used in voltage more than 250V.

REF. NO.	PART NO.	DESCRIPTION	Q'TY	CODE
ELECTRIC PARTS				
* C1, C2 F1 F2 F3, F4	FMOTEA309WRK0	Blower motor	1	BH
	RC-QZA264WRE0	High voltage capacitor	2	AY
	QFS-CA017WRE0	Weak point A017	1	AF
	QFS-CA007WRE0	Fuse 6.3A	1	AD
* F5, F6 F5, F6 MG1, MG2 OL R1	QFS-CA010WRE0	Fuse M8A	2	AE
	QFS-IA002WRE0	High voltage fuse 0.75A/ 5kV [R-23AM/23AT]	2	AQ
	QFS-IA004WRE0	High voltage fuse 0.6A/ 5kV [R-22AM]	2	AK
	RV-MZA300WRE0	Magnetron	2	BG
Δ*	RLMPTA028WRE0	Oven lamp	1	AK
	RR-WZA020WRE0	Monitor resistor 4.3 ohm 20W	1	AF
	RMOTDA238WRZZ	Stirrer motor	2	AR
	QSW-MA095WRE0	1st. latch switch	1	AF
* SW1 SW2 SW3 SW4	QSW-MA095WRE0	2nd. latch switch	1	AF
	QSW-MA095WRE0	3rd. latch switch	1	AF
	QSW-MA086WRE0	Monitor switch	1	AF
	QSW-MA085WRE0	Stop switch	1	AF
* T1, T2 T1, T2 TF1, TF2 TF3, TF4	RTRN-A599WRE0	High voltage transformer [R-23AM/R-23AT]	2	BM
	RTRN-A600WRE0	High voltage transformer [R-22AM]	2	BN
	QFS-TA014WRE0	Temperature fuse 150°C (MG.)	2	AG
	QFS-TA015WRE0	Temperature fuse 120°C (OVEN, BM.)	2	AG
* 1- 1 1- 2 1- 3 1- 4 1- 5	FH-HZA064WRE0	Oven thermistor (2)	1	AV
	QSOCLA024WRE0	Oven lamp socket	1	AH
	FW-QZA117WRK0	High voltage rectifier assembly	1	AU
	FPWBFA335WRE0	Noise filter	1	AX
* 1- 5 1- 6 1- 7	QFSHDA019WRE0	Fuse holder	3	AH
	FACCVAA013WRK0	Power supply cord	1	BG
	FH-HZA070WRE0	Oven thermistor (1) & Magnetron thermistor	2	AM

CABINET PARTS

2- 1	FDAI-A183WRW0	Base plate assembly	1	BC
2- 2	PSHEGA006WRE0	Rubber sheet A	2	AF
2- 3	PSHEGA007WRE0	Rubber sheet B	2	AE
2- 4	GCOVAA283WRW0	Rear cabinet	1	AX
2- 5	FFTASA064WRY0	Oven lamp access cover assembly	1	AN
2-5-1	PCUSU0407WRP0	Cushion	1	AA
2-5-2	PREFHA059WRP0	Reflector	1	AF
2- 6	GCABUA523WRP0	Outer case cabinet	1	BA
2- 7	FFPF-A016WRK0	Vibration-proof sheet	1	AU
2- 8	PZETEA079WRP0	Insulation sheet	2	AC

OVEN PARTS

Δ	4- 1	PZETEA047WRP0	Switch insulator	1	AC
	4- 2	FDUC-A345WRY0	Exhaust duct assembly	1	AP
	4- 3	FOVN-A444WRY0	Oven cavity	1	BS
	4- 4	PFILWA053WRP0	Oven light screen (Inside)	1	AE
Δ	4- 5	MLEVPA153WRF0	Switch lever A	1	AC
	4- 6	MLEVPA154WRF0	Switch lever B	1	AC
	4- 7	MLEVPA155WRF0	Switch lever C	1	AC
	4- 8	MSPRCA075WRE0	Switch spring A	1	AB
Δ	4- 9	MSPRCA076WRE0	Switch spring B	2	AB
	4-10	PHOK-A081WRF0	Latch hook	1	AP
	4-11	MHNG-A216WRM0	Lower oven hinge	1	AG
	4-12	PCUSUA442WRP0	Cushion	1	AF
Δ	4-13	PCUSU0407WRP0	Cushion	1	AA
	4-14	FGLSPA063WRY0	Ceramic shelf	1	BF
	4-15	FPLT-A008WRY0	Stirrer antenna upper assembly	1	AV
	4-16	FPLT-A009WRY0	Stirrer antenna lower assembly	1	AV
Δ	4-17	LANGKA762WRP0	Partition angle R	1	AE
	4-18	LANGQA370WRP0	Oven lamp mounting plate	1	AD
	4-19	LBNDKA068WRP0	Capacitor holder	1	AD
	4-20	PGIDHA054WRW0	Water-proof cover	1	AF
Δ	4-21	NSFTPA031WRF0	Antenna motor shaft	2	AH
	4-22	PCUSUA451WRP0	Cushion	1	AB
	4-23	PCUSUA417WRP0	Cushion	1	AB
	4-24	MHNG-A215WRM0	Upper oven hinge	1	AG
Δ	4-25	PCUSUA413WRP0	Cushion	1	AG
	4-26	PCUSUA415WRP0	Cushion	3	AC
	4-27	PDUC-A729WRF0	Air duct	1	AL
	4-28	PDUC-A564WRW0	Mg exhaust duct	1	AP
Δ	4-29	PCUSUA414WRP0	Cushion	1	AD
	4-30	LANGKA679WRM0	Fixing angle S	1	AD
	4-31	HDECQA147WRM0	Corner cap right	1	AE
	4-32	LANGFA195WRP0	Chassis support	1	AG

Note: The parts marked "Δ" may cause undue microwave exposure.
The parts marked "*" are used in voltage more than 250V.

REF. NO.	PART NO.	DESCRIPTION	Q'TY	CODE
4-33	LBSCA012WRE0	Cord bushing	1	AD
4-34	PCOVPA351WRF0	Stirrer cover	1	BA
4-35	FFIL-A005WRK0	Air intake filter assembly	1	AS
4-36	HDECEA001WRP0	Decoration sash	1	AR
4-37	HDECQA146WRM0	Corner cap left	1	AE
4-38	PCUSGA409WRP0	Cushion	2	AE
4-39	LANGQA440WRM0	Earth angle	1	AE
4-40	LANGQA512WRP0	Thermistor angle	1	AE
4-41	PCUSUA458WRP0	Cushion	1	AB
4-42	LANGQA514WRW0	Noise filter angle	1	AF
4-43	PCUSUA268WRP0	Cushion	1	AA
4-44	MSPRCA101WRE0	Switch lever spring C	1	AC

DOOR PARTS

Δ	5	DDORFA746WRK0	Door assembly	1	BP
Δ	5- 1	FDORFA289WRT0	Door panel assembly	1	BH
	5- 2	GCOVAA242WRY0	Door case	1	BD
	5- 3	FHNDMA011WRY0	Door lever assembly	1	AP
	5- 4	GCOVHA350WRF0	Choke cover	1	AR
	5- 5	JHNDPA169WRM0	Door handle	1	AU
	5- 6	LANGKA766WRP0	Outside window fixing plate	2	AF
	5- 7	PCUSGA430WRP0	Cushion	2	AM
	5- 8	PGLSPA457WRE0	Door glass	1	AV
	5- 9	PPACGA142WRP0	Door case packing	2	AF
	5-10	PSHEPA428WRE0	Sealer film	1	AF
	5-11	XWSSD40-10000	Washer : 4mm x 1mm	2	AA
	5-12	XFPSD40P08K00	Screw : 4mm x 8mm	3	AA
	5-13	XHTSD40P08RV0	Screw : 4mm x 8mm	4	AA
	5-14	FANGKA200WRY0	Latch fixing angle	1	AQ
	5-15	FLEVFA019WRY0	Joint lever	1	AP
Δ	5-16	LSTPCA002WRM0	Latch head	2	AM
	5-17	MLEVPA220WRF0	Head lever	1	AM
	5-18	MSPRCA097WRE0	Latch spring	1	AG
	5-19	HBDGCA093WRE0	Door badge [R-23AT]	1	AF
	5-19	HBDGCA095WRE0	Door badge [R-23AM]	1	AF
	5-19	HBDGCA096WRE0	Door badge [R-22AM]	1	AF
	5-20	XEPSD40P20000	Screw : 4mm x 20mm	2	AB
	5-21	PCUSUA523WRP0	Door lever cushion	2	AE
	5-22	PSPA-A102WRE0	Door case spacer	2	AE

MISCELLANEOUS

	6- 1	TINSMA014WRR0	Operation manual [R-23AT]	1	AR
	6- 1	TINSMA016WRR0	Operation manual [R-22AM, R-23AM]	1	AM
	6- 2	TLABHA029WRR0	Menu sticker [R-23AT]	1	AC
	6- 3	FW-VZB769WRE0	Switch harness	1	AR
	6- 4	FW-VZB765WRE0	Main wire harness	1	BB
	6- 5	TLAB-A186WRR0	AL label	1	AB
	6- 6	LBNDKA079WRE0	Wire holder	3	AB
	6- 7	PTUB-A048WRZZ	Tube	1	AF
	6- 8	TCAUHA083WRR0	Belgium label	1	AB
	6- 9	TSPCNC831WRR0	Rating label [R-23AT]	1	AK
	6- 9	TSPCNC834WRR0	Rating label [R-23AM]	1	AK
	6- 9	TSPCNC835WRR0	Rating label [R-22AM]	1	AK
	6-10	TCAUHA176WRR0	H caution label	1	AC
	6-11	TCAUHA082WRR0	Caution label	1	AC
	6-12	TCAUHA257WRR0	S caution sheet	1	AE
	6-13	LHOLDA004WRE0	Cord holder	1	AA
	6-14	PZET-A018WRE0	Terminal insulator	2	AC
	6-15	TLABSA064WRR0	A017 label	1	AC
	6-16	LHLDWQ004YBE0	Purse lock L	1	AA
	6-17	TLABSA069WRR0	Fuse label F6.3A	1	AB
	6-18	TLABSA070WRR0	Fuse label M8A	2	AB
	6-19	TLABSA066WRR0	Equipotential label	1	AD

SCRE,NUTS AND WASHERS

	7- 1	XCBWW30P08000	Screw : 3mm x 8mm	2	AB
	7- 2	XBPSD30P28KS0	Screw : 3mm x 28mm	1	AA
	7- 3	XNESD30-24000	Nut : 3mm x 2.4mm	1	AA
	7- 4	LX-BZA130WRE0	Special screw	1	AD
	7- 5	LX-BZA116WRE0	Special screw	2	AD
	7- 6	XPWW40P04000	Screw : 4mm x 4mm	4	AB
	7- 7	LX-BZA041WRE0	Special screw	2	AA
	7- 8	LX-BZA125WRE0	Special screw	2	AB
	7- 9	LX-CZA038WRE0	Special screw	2	AA
	7-10	LX-EZA004WRE0	Special screw	2	AA

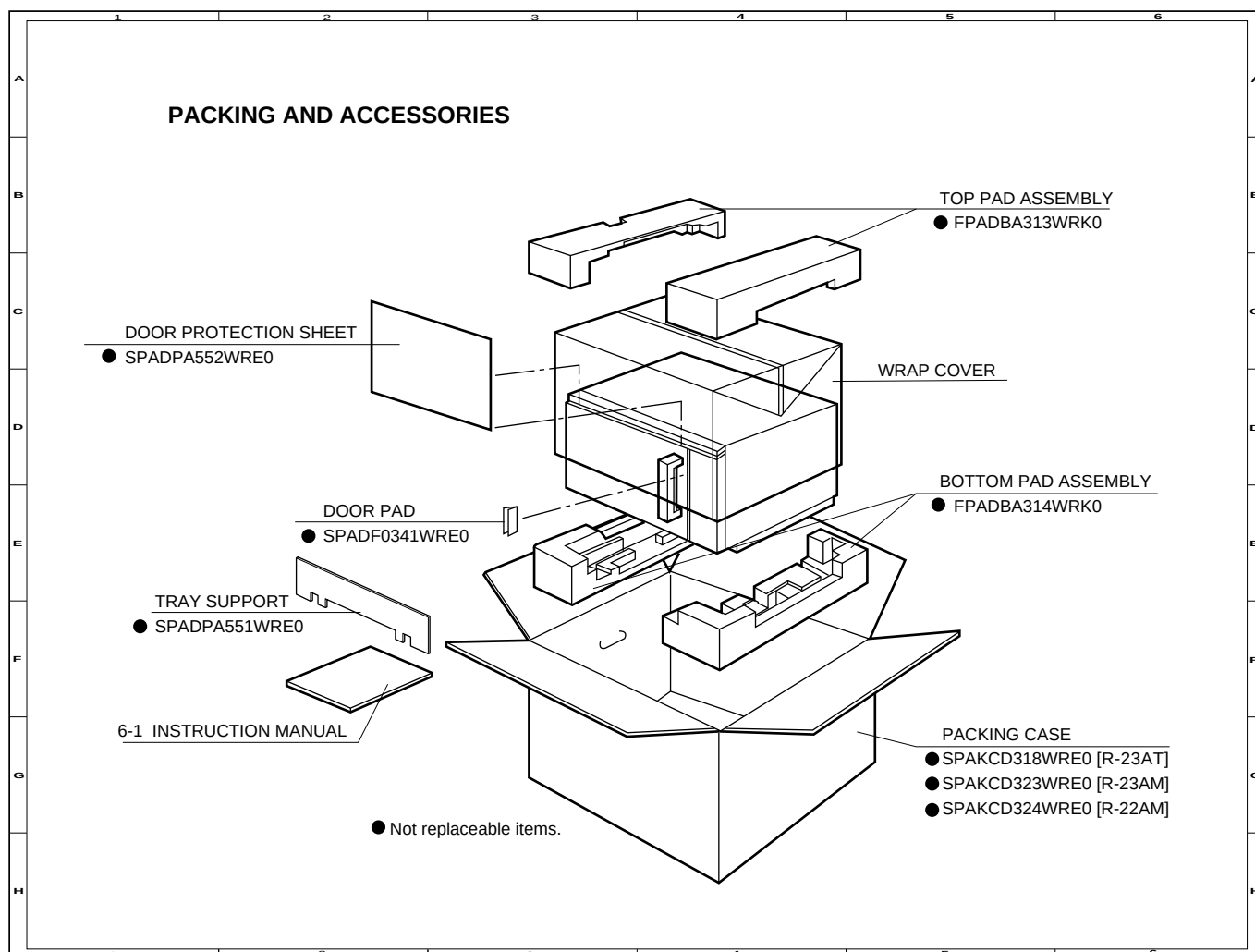
**Note: The parts marked "Δ" may cause undue microwave exposure.
The parts marked "*" are used in voltage more than 250V.**

REF. NO.	PART NO.	DESCRIPTION	Q'TY	CODE
7-11	XOTSD40P06000	Screw : 4mm x 6mm	2	AA
7-12	LX-NZ0082WRE0	Special nut	1	AA
7-13	XFTSD40P12000	Screw : 4mm x 12mm	1	AA
7-14	XHPSD50P08000	Screw : 5mm x 8mm	8	AB
7-15	XBPSD50P12KS0	Screw : 5mm x 12mm	4	AC
7-16	XHTSD40P08RV0	Screw : 4mm x 8mm	17	AA
7-17	XOTSD40P12000	Screw : 4mm x 12mm	6	AA
7-18	XOTW40P10000	Screw : 4mm x 10mm	12	AB
7-19	XJPSD40P10000	Screw : 4mm x 10mm	2	AA
7-20	XCPSD30P10000	Screw : 3mm x 10mm	3	AA
7-21	LX-WZA035WRE0	Special washer	2	AB
7-22	XOTW40P08000	Screw : 4mm x 8mm	7	AB
7-23	PSPA-A101WRE0	Special washer	4	AB
7-24	XCPSD30P06000	Screw : 3mm x 6mm	2	AA
7-25	LX-BZA064WRE0	Special screw	1	AA
7-26	XOTSC40P12000	Screw : 4mm x 12mm	5	AA
7-27	LX-EZA042WRE0	Special screw	4	AB
7-28	XFTSD40P08000	Screw : 4mm x 8mm	1	AA
7-29	XTPSD40P08000	Screw : 4mm x 8mm	2	AA
7-30	XWSD50-06000	Washer : 5mm x 0.6mm	4	AA
7-31	XONSC40P10000	Screw : 4mm x 10mm	1	AA
7-32	XWSSD40-10000	Washer: 4mm x 1mm	1	AA
7-33	XOTSD40P10RV0	Screw : 4mm x 10mm	1	AA

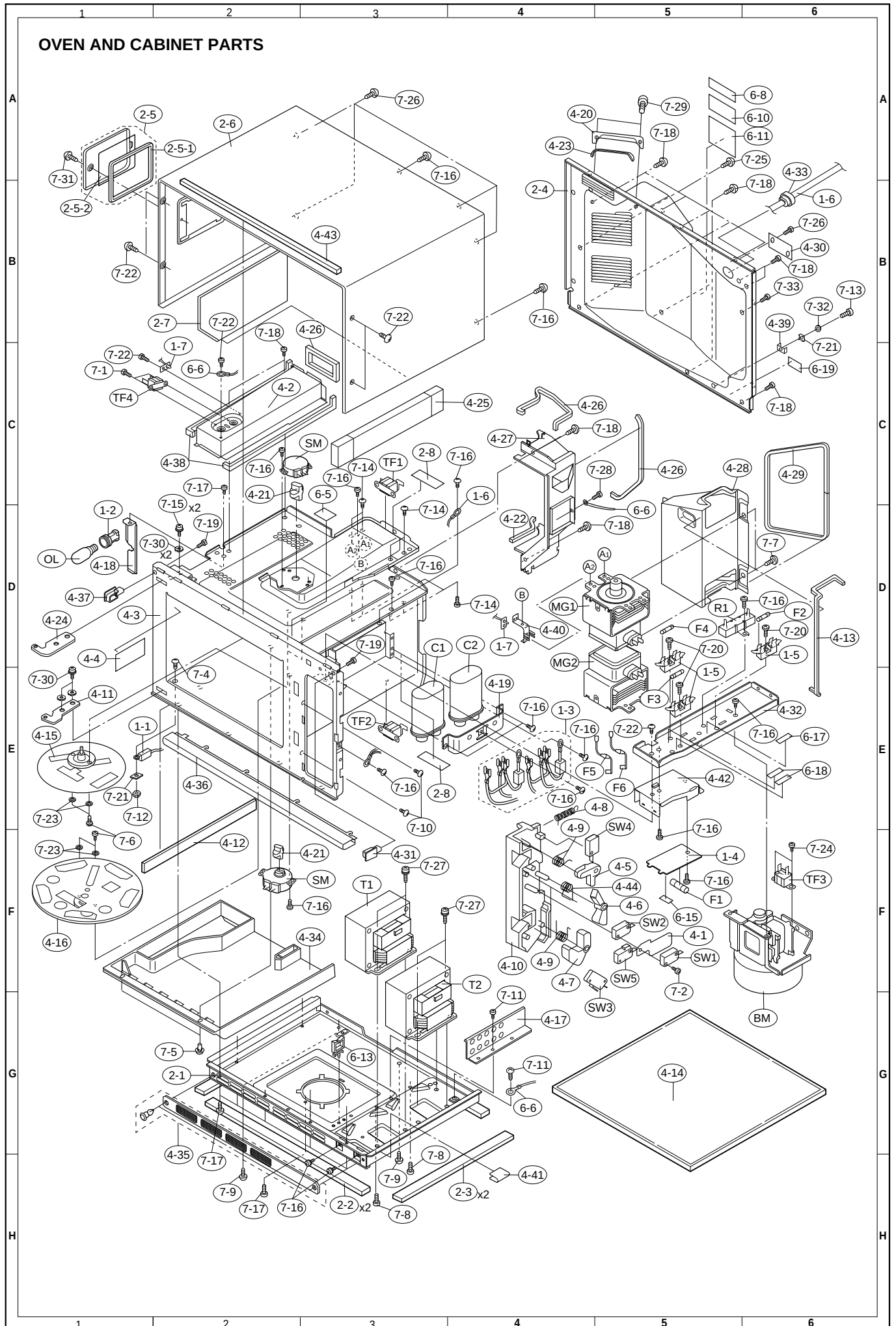
HOW TO ORDER REPLACEMENT PARTS

To have your order filled promptly and correctly, please furnish the following information.

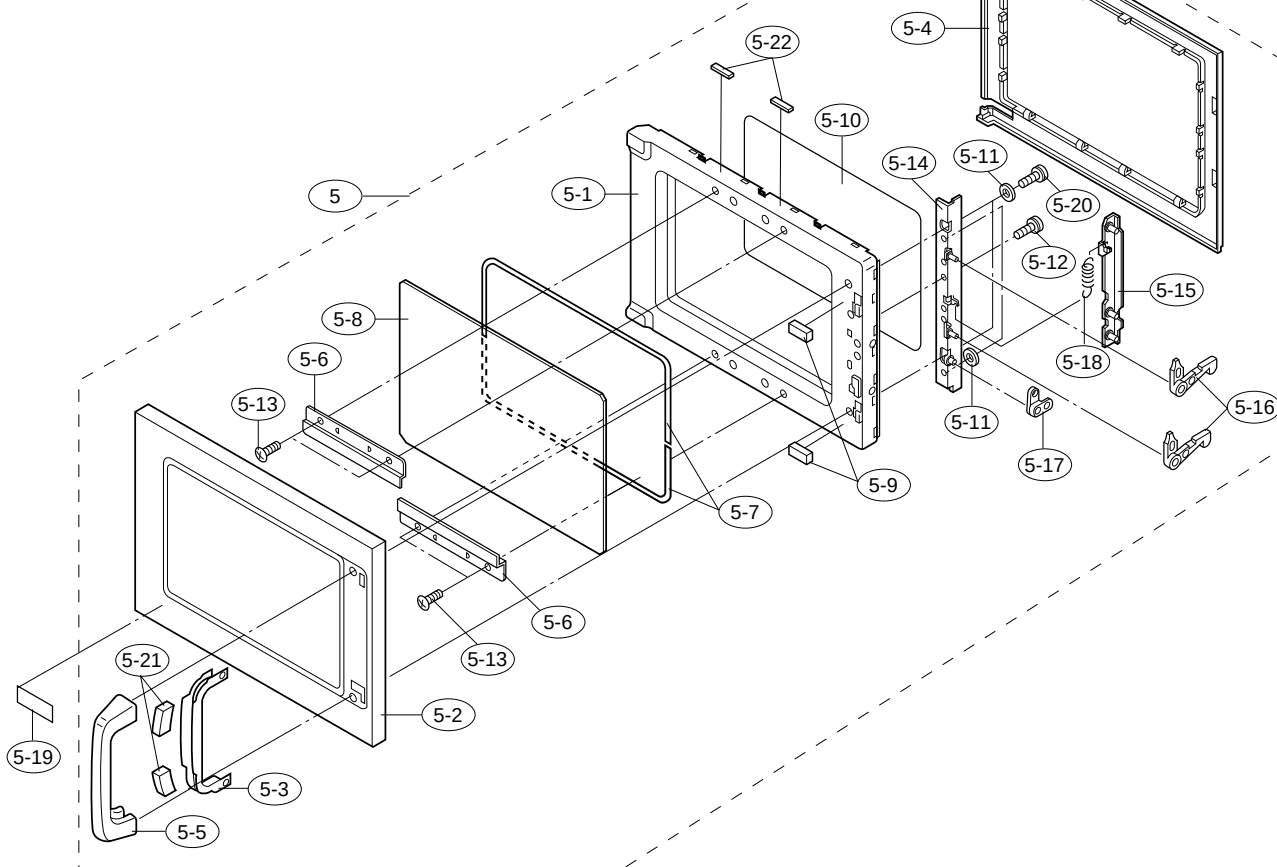
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2. REF. NO.
3. PART NO.
4. DESCRIPTION



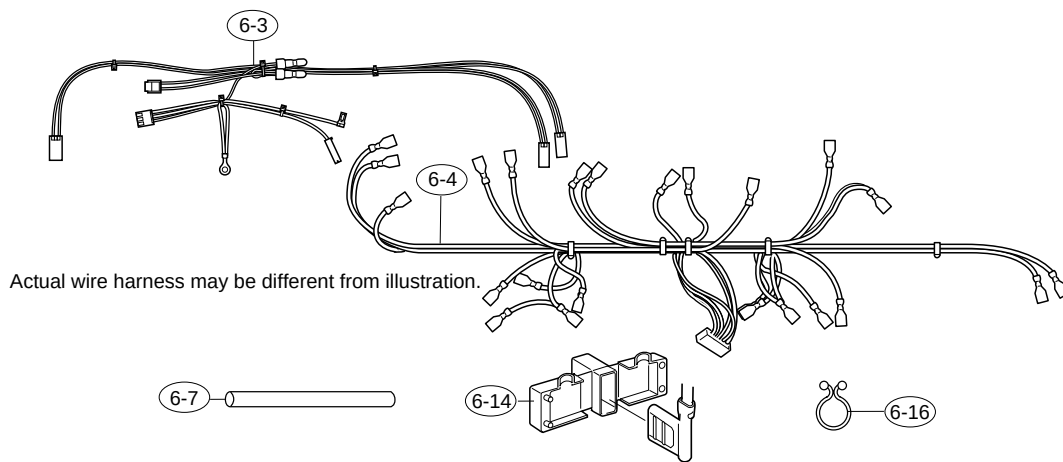
OVEN AND CABINET PARTS



DOOR PARTS



MISCELLANEOUS



CONTROL PANEL PARTS FOR R-23AT

REF. NO.	PART NO.	DESCRIPTION	Q'TY	CODE
3- 1	DPWBFC001WRU0	Control unit	1	BM
3- 1A	QCNCMA308DRE0	4-pin connector (A)	1	AC
3- 1B	QCNCMA312DRE0	3-pin connector (B)	1	AB
3- 1C	QCNCWA030DRE0	12-pin connector (G)	1	AF
3- 1D	QCNCMA039DRE0	3-pin connector (H)	1	AB
3- 1E	QLUG-A002PRE0	Tab terminal (TAB1-4)	4	AB
3- 1F	RV-KXA053DRE0	Fluorescent display tube	1	AW
3- 1G	PCUSGA359WRP0	Cushion	2	AC
C1	VCKYD11HF104Z	Capacitor 0.1 uF 50V	1	AB
C2	RC-EZA192DRE0	Capacitor 1000 uF 35V	1	AD
C3	VCEAB31HW335M	Capacitor 3.3 uF 50V	1	AA
C4	VCKYB11EX103N	Capacitor 0.01 uF 25V	1	AA
C5	VCEAB31AW476M	Capacitor 47 uF 10V	1	AA
C6-7	VCKYD11CY103N	Capacitor 0.01 uF 16V	2	AA
C8	VCEAB31CW107M	Capacitor 100 uF 16V	1	AB
C9	VCEAB31EW226M	Capacitor 22 uF 25V	1	AA
C20	VCKYD11CY103N	Capacitor 0.01 uF 16V	1	AA
C21	VCKYF31HF103Z	Capacitor 0.01 uF 50V	1	AA
C22	VCKYD11CY103N	Capacitor 0.01 uF 16V	1	AA
C30	VCKYD11CY103N	Capacitor 0.01 uF 16V	1	AA
C61-62	VCEAB31EW226M	Capacitor 22 uF 25V	2	AA
C70	VCKYF31HF103Z	Capacitor 0.01 uF 50V	1	AA
C71	VCKYD11CY103N	Capacitor 0.01 uF 16V	1	AA
C72	VCKYB11EX103N	Capacitor 0.01 uF 25V	1	AA
C74	VCKYD11HF104Z	Capacitor 0.1 uF 50V	1	AB
C80	VCEAB31HW104M	Capacitor 0.1 uF 50V	1	AM
C81	VCEAB31HW225M	Capacitor 2.2 uF 50V	1	AA
C82	VCEAB31HW105M	Capacitor 1.0 uF 50V	1	AA
C200	VRD-B12EF183J	Resistor 18k ohm 1/4W	1	AA
CF1	RCRS-A010DRE0	Ceramic resonator (CST4.00MGW)	1	AD
D1-4	VHD11ES1///-1	Diode (11ES1)	4	AB
D5	VHD1SS270A/-1	Diode (1SS270A)	1	AA
D6-7	VHD11ES1///-1	Diode (11ES1)	2	AB
D61-64	VHD1SS270A/-1	Diode (1SS270A)	4	AA
D70	VHD11ES1///-1	Diode (11ES1)	1	AB
D71	VHD1SS270A/-1	Diode (1SS270A)	1	AA
D81	VHD1SS270A/-1	Diode (1SS270A)	1	AA
D83-84	VHD1SS270A/-1	Diode (1SS270A)	2	AA
D93-97	VHD1SS270A/-1	Diode (1SS270A)	5	AA
IC1	RH-IZA646DRE0	LSI	1	AX
IC2	RH-IZA571DRE0	IC (AT24C04)	1	AP
Q1	VS2SB953-PQ-4	Transistor (2SB953)	1	AG
Q2	VS2SA933AS/-3	Transistor (2SA933ASTP)	1	AB
Q20	RH-TZA037CBE0	Transistor (KRA101M)	1	AA
Q40	RH-TZA037CBE0	Transistor (KRA101M)	1	AA
Q41	VS2SB1238/-3	Transistor (2SB1238)	1	AA
Q80	VSDTA114YSA-3	Transistor (DTA114YSA)	1	AB
Q81	VSDTD143ES/-3	Transistor (DTD143ES)	1	AC
Q83-84	VSDTB143ES/-3	Transistor (DTB143ES)	2	AC
R1	VRD-B12EF182J	Resistor 1.8k ohm 1/4W	1	AA
R3	VRD-B12HF561J	Resistor 560 ohm 1/2W	1	AA
R4	VRD-B12EF102J	Resistor 1.0k ohm 1/4W	1	AA
R5	VRD-B12EF153J	Resistor 15k ohm 1/4W	1	AA
R6	VRD-B12HF150J	Resistor 15 ohm 1/2W	1	AA
R20	VRD-B12EF153J	Resistor 15k ohm 1/4W	1	AA
R31	VRD-B12EF153J	Resistor 15k ohm 1/4W	1	AA
R32	VRD-B12EF272J	Resistor 2.7k ohm 1/4W	1	AA
R33	VRD-B12EF103J	Resistor 10k ohm 1/4W	1	AA
R40	VRD-B12EF332J	Resistor 3.3k ohm 1/4W	1	AA
R41	VRD-B12EF203J	Resistor 20k ohm 1/4W	1	AA
R42	VRD-B12EF393J	Resistor 39k ohm 1/4W	1	AA
R43	VRD-B12EF103J	Resistor 10k ohm 1/4W	1	AA
R50	VRD-B12EF182J	Resistor 1.8k ohm 1/4W	1	AA
R61-62	VRN-B12EK202F	Resistor 2.0k ohm(F) 1/4W	2	AA
R63-64	VRD-B12EF102J	Resistor 1.0k ohm 1/4W	2	AA
R65-66	VRD-B12EF304J	Resistor 300k ohm 1/4W	2	AA
R67-68	VRD-B12EF473J	Resistor 47k ohm 1/4W	2	AA
R70	VRD-B12EF101J	Resistor 100 ohm 1/4W	1	AA
R71	VRD-B12EF303J	Resistor 30k ohm 1/4W	1	AA
R72	VRD-B12EF112J	Resistor 1.1k ohm 1/4W	1	AA
R73	VRD-B12EF333J	Resistor 33k ohm 1/4W	1	AA
R74	VRD-B12EF332J	Resistor 3.3k ohm 1/4W	1	AA
R79	VRD-B12EF473J	Resistor 47k ohm 1/4W	1	AA
R80	VRD-B12EF471J	Resistor 470 ohm 1/4W	1	AA
R83-84	VRD-B12HF390J	Resistor 39 ohm 1/2W	2	AA
R93-101	VRD-B12EF153J	Resistor 15k ohm 1/4W	9	AA
R200	VRD-B12EF472J	Resistor 4.7k ohm 1/4W	1	AA

REF. NO.	PART NO.	DESCRIPTION	Q'TY	CODE
R201	VRD-B12EF682J	Resistor 6.8k ohm 1/4W	1	AA
R300	VRD-B12EF105J	Resistor 1.0M ohm 1/4W	1	AA
(J2)	VRD-B12EF822J	Resistor 8.2k ohm 1/4W	1	AB
(J3)	VRD-B12EF363J	Resistor 36k ohm 1/4W	1	AA
RY1	RRLY-A078DRE0	Relay (0J-SH-118LM)	1	AG
RY3-4	RRLY-A059DRE0	Relay (VS14MB)	2	AK
SP1	RALM-A014DRE0	Buzzer (PKM22EPT)	1	AG
T1	RTRNPA080DRE0	Touch control transformer	1	AU
CT1-2	RTRN-A060DRE0	Current transformer	2	AH
VRS1	RH-VZA010DRE0	Varistor (TNR15G471K)	1	AE
ZD1	VHEHZ12C1///-1	Zener diode (HZ12C1)	1	AA
ZD2	VHEHZ4C3///-1	Zener diode (HZ4C3)	1	AA
3- 2	FPNLCA470WRK0	Control panel frame with key unit assembly	1	BA
3- 2-1	FUNTKA965WRE0	Key unit	1	AW
3- 2-2	HDECAA195WRP0	Decoration metal fittings	1	AP
3- 2-3	PCUSUA451WRP0	Cushion	1	AB
3- 2-4	PCUSGA380WRP0	Cushion	1	AB
3- 3	LANGTA243WRW0	Control panel mounting angle	1	AF
3- 4	XEPSD30P10XS0	Screw; 3mm x 10mm	6	AA
3- 5	XEPSD40P12000	Screw; 4mm x 12mm	1	AA
3- 6	XHTSD40P08RV0	Screw; 4mm x 8mm	1	AA
3- 7	XCTSD40P08000	Screw; 4mm x 8mm	1	AA

CONTROL PANEL PARTS FOR R-23AM / R-22AM

REF. NO.	PART NO.	DESCRIPTION	Q'TY	CODE
3- 1	DPWBFC007WRU0	Control unit [R-23AM]	1	BK
3- 1	DPWBFC009WRU0	Control unit [R-22AM]	1	BK
3- 1A	QCNCMA308DRE0	4-pin connector (A)	1	AC
3- 1B	QCNCMA312DRE0	3-pin connector (B)	1	AB
3- 1C	QCNCMA381DRE0	5-pin connector (E)	1	AD
3- 1D	QCNCMA039DRE0	3-pin connector (H)	1	AB
3- 1E	QCNCMA338DRE0	3-pin connector (J)	1	AB
3- 1F	QLUG-A002PRE0	Tab terminal (TAB1-4)	4	AB
3- 1G	RV-KXA053DRE0	Fluorescent display tube	1	AW
3- 1H	PCUSGA400WRP0	Cushion	2	AC
C1	VCKYD11HF104Z	Capacitor 0.1 uF 50V	1	AB
C2	RC-EZA192DRE0	Capacitor 1000 uF 35V	1	AD
C3	VCEAB31HW335M	Capacitor 3.3 uF 50V	1	AA
C4	VCKYB11EX103N	Capacitor 0.01 uF 25V	1	AA
C5	VCEAB31CW476M	Capacitor 47 uF 16V	1	AA
C6-7	VCKYD11CY103N	Capacitor 0.01 uF 16V	2	AA
C8	VCEAB31CW107M	Capacitor 100 uF 16V	1	AB
C9	VCEAB31EW226M	Capacitor 22 uF 25V	1	AA
C10	VCKYD11HF104Z	Capacitor 0.1 uF 50V	1	AB
C11	VCKYD11CY103N	Capacitor 0.01 uF 16V	1	AA
C12	VCKYD11HF104Z	Capacitor 0.1 uF 50V	1	AB
C20	VCEAB31HW104M	Capacitor 0.1 uF 50V	1	AM
C21	VCEAB31VW475M	Capacitor 4.7 uF 35V	1	AA
C30-31	VCEAB31EW226M	Capacitor 22 uF 25V	2	AA
C50	VCKYD11CY103N	Capacitor 0.01 uF 16V	1	AA
C60	VCKYB11EX103N	Capacitor 0.01 uF 25V	1	AA
C80-81	RC-KZA129DRE0	Capacitor 2200 pF 16V	2	AB
C90	VRD-B12EF183J	Resistor 18k ohm 1/4W	1	AA
CF1	RCRS-A010DRE0	Ceramic resonator CST4.00MGW	1	AD
D1-4	VHD11ES1///-1	Diode (11ES1)	4	AB
D5	VHD1SS270A/-1	Diode (1SS270A)	1	AA
D6-7	VHD11ES1///-1	Diode (11ES1)	2	AB
D20	VHD11ES1///-1	Diode (11ES1)	1	AB
D21-23	VHD1SS270A/-1	Diode (1SS270A)	3	AA
D30-33	VHD1SS270A/-1	Diode (1SS270A)	4	AA
D50	VHD1SS270A/-1	Diode (1SS270A)	1	AA
IC1	RH-IZA648DRE0	LSI	1	AV
Q1	VS2SB953-PQ-4	Transistor (2SB953)	1	AG
Q2	VS2SA933AS/-3	Transistor (2SA933ASTP)	1	AB
Q10	RH-TZA037CBE0	Transistor (KRA101M)	1	AA
Q20	VSDDTA114YSA-3	Transistor (DTA114YSA)	1	AB
Q21	VSDDTD143ES/-3	Transistor (DTD143ES)	1	AC
Q22-23	VSDDTB143ES/-3	Transistor (DTB143ES)	2	AC
Q70	RH-TZA037CBE0	Transistor (KRA101M)	1	AA
R1	VRD-B12EF182J	Resistor 1.8k ohm 1/4W	1	AA
R2	VRD-B12HF561J	Resistor 560 ohm 1/2W	1	AA
R3	VRD-B12EF102J	Resistor 1.0k ohm 1/4W	1	AA
R4	VRD-B12EF153J	Resistor 15k ohm 1/4W	1	AA
R5	VRD-B12HF150J	Resistor 15 ohm 1/2W	1	AA
R10	VRD-B12EF153J	Resistor 15k ohm 1/4W	1	AA
R20	VRD-B12EF471J	Resistor 470 ohm 1/4W	1	AA
R22-23	VRD-B12HF390J	Resistor 39 ohm 1/2W	2	AA

REF. NO.	PART NO.	DESCRIPTION	Q'TY	CODE
R30-31	VRD-B12EF202J	Resistor 2.0k ohm 1/4W	2	AA
R32-33	VRD-B12EF102J	Resistor 1.0k ohm 1/4W	2	AA
R34-35	VRD-B12EF304J	Resistor 300k ohm 1/4W	2	AA
R36-37	VRD-B12EF473J	Resistor 47k ohm 1/4W	2	AA
R40	VRD-B12EF112J	Resistor 1.1k ohm 1/4W	1	AA
R41	VRD-B12EF114J	Resistor 110k ohm 1/4W	1	AA
R42	VRD-B12EF332J	Resistor 3.3k ohm 1/4W	1	AA
R50	VRD-B12EF101J	Resistor 100 ohm 1/4W	1	AA
R51	VRD-B12EF512J	Resistor 5.1k ohm 1/4W	1	AA
R63	VRD-B12EF473J	Resistor 47k ohm 1/4W	1	AA
R65	VRD-B12EF182J	Resistor 1.8k ohm 1/4W [R-23AM]	1	AA
R65	VRD-B12EF242J	Resistor 2.4k ohm 1/4W [R-22AM]	1	AA
R70	VRD-B12EF332J	Resistor 3.3k ohm 1/4W	1	AA
R80-81	VRD-B12EF224J	Resistor 220k ohm 1/4W	2	AA
R82-83	VRD-B12EF472J	Resistor 4.7k ohm 1/4W	2	AA
R84-85	VRD-B12EF153J	Resistor 15k ohm 1/4W	2	AA
R90	VRD-B12EF472J	Resistor 4.7k ohm 1/4W	1	AA
R91	VRD-B12EF682J	Resistor 6.8k ohm 1/4W	1	AA
(5)	VRD-B12EF332J	Resistor 3.3k ohm 1/4W	1	AA
RY1	RRLY-A078DRE0	Relay (OJ-SH-118LM)	1	AG
RY2-3	RRLY-A059DRE0	Relay (VS14MB)	2	AK
SP1	RALM-A007DRE0	Buzzer (PKM22EPT-CA)	1	AF
T1	RTRNPA080DRE0	Touch control transformer	1	AU
CT1-2	RTRN-A060DRE0	Current transformer	2	AH
VRS1	RH-VZA034DRE0	Varistor (10G471K)	1	AD
ZD1	VHEHZ12C1/-1	Zener diode (HZ12C1)	1	AA
ZD2	VHEHZ4C3///-1	Zener diode (HZ4C3)	1	AA
3- 2	FPNLCB472WRK0	Control panel frame assembly	1	AX
3- 2-1	GMADIA067WRF0	Display window	1	AE
3- 2-2	HDECAA207WRP0	Decorative metal fittings	1	AT
3- 2-3	HPNLCB155WRF0	Control panel	1	BA
3- 2-4	PCUSUA451WRP0	Cushion	1	AB
3- 3	LANGTA243WRW0	Control panel mounting angle	1	AF
3- 4	XEPSD30P10XS0	Screw; 3mm x 10mm	11	AA
3- 5	XEPSD40P12000	Screw; 4mm x 12mm	1	AA
3- 6	XFPSD40P08K00	Screw; 4mm x 8mm	1	AA
3- 7	JKNBKA510WRM0	Knob	1	AE
3- 8	LANGTA304WRP0	Rotary encoder mounting plate	1	AD
3- 9	RVR-BA016WRK0	Rotary encoder	1	AY
3- 10	JBTN-A895WRM0	Select button	4	AE
3- 11	JBTN-A896WRM0	Start button	1	AE
3- 12	DPWBFB195WRU0	Switch unit assembly	1	AP
3- 12-1	FW-VZA165DRE0	Lead wire harness (2-pin)	1	AF
3- 12-2	FW-VZA166DRE0	Lead wire harness (5-pin)	1	AH
3- 12-3	QSW-PA025DRE0	Tact switch (SW1-SW5)	5	AD
3- 13	PCUSUA404WRP0	Select cushion	4	AC
3- 14	PCUSGA401WRP0	Cushion	1	AD
3- 15	MSPRPA082WRE0	Spring	1	AD
3- 16	PCUSUA407WRP0	Water proof cushion B	1	AB
3- 17	PCUSUA408WRP0	Water proof cushion C	1	AC
3- 18	PCUSUA406WRP0	Water proof cushion A	1	AB
3- 19	PSHEGA005WRP0	Water proof sheet	1	AE
3- 20	QW-VZA122WRE0	Earth wire	1	AC
3- 21	XEPSD30P08XS0	Screw; 4mm x 8mm	2	AA
3- 22	XHTSD40P08RV0	Screw; 4mm x 8mm	1	AB
3- 23	LX-WZA049WRE0	Special washer	1	AA

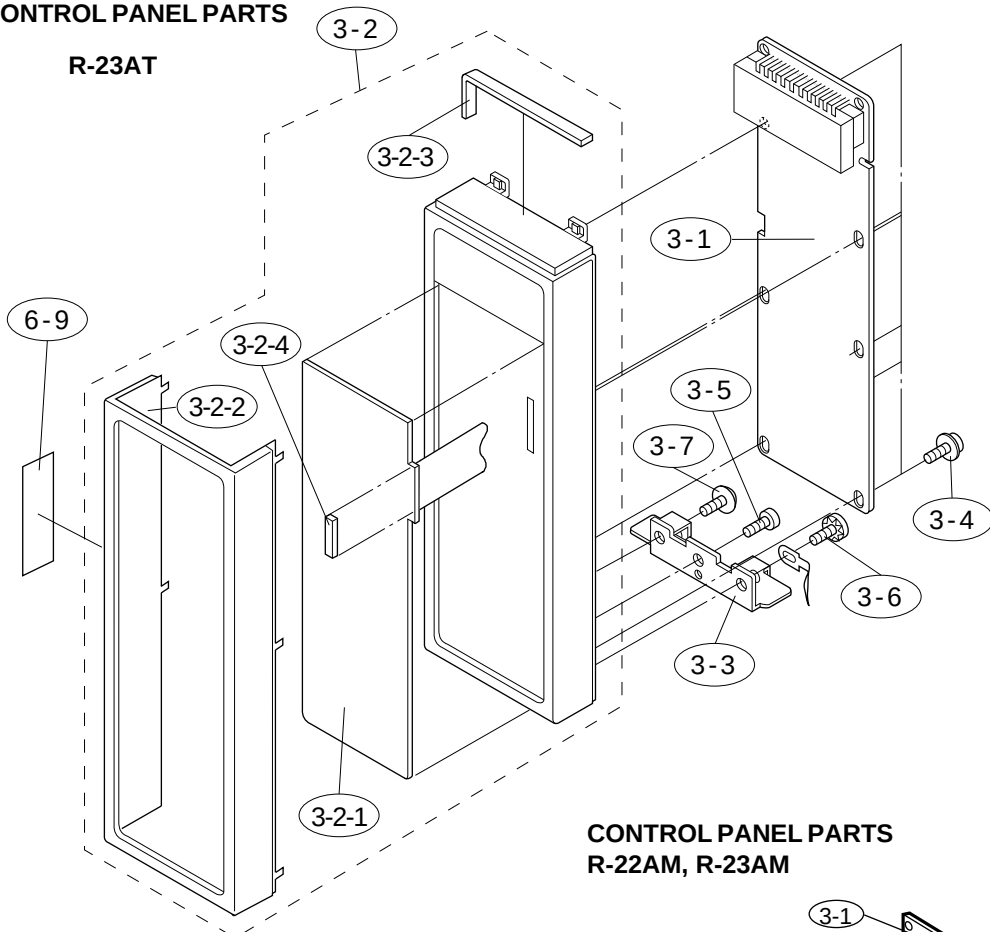
HOW TO ORDER REPLACEMENT PARTS

To have your order filled promptly and correctly, please furnish the following information.

1. MODEL NUMBER 2. REF. NO. 3. PART NO. 4. DESCRIPTION

CONTROL PANEL PARTS

R-23AT



CONTROL PANEL PARTS R-22AM, R-23AM

